TEACHING SKILLS

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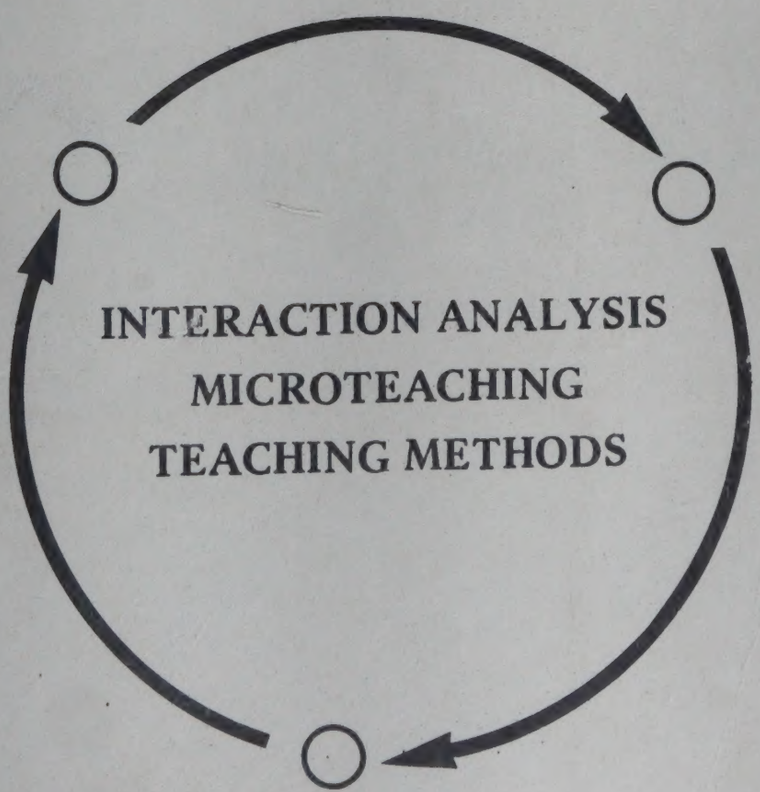
A Manual for Health Trainers

PART ONE



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TEACHING SKILLS

A MANUAL FOR HEALTH TRAINERS

PART I

1 INTERACTION ANALYSIS

2. MICROTEACHING SKILLS

3. TEACHING METHODS

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PREFACE

This manual has been designed specifically to meet the learning needs of the health trainers undertaking the Diploma in Education (Health Professions) course conducted at Medical Training Centre, Nairobi, Kenya. The draft manual has been field tested over a period of two years, and many modifications made as a result of the field testing. However, there are still shortcomings in both the design of the manual and some of the contents but it was necessary for a variety of reasons to get the manual into print without further delay. Consequently, as editor/designer of the manual, I feel there is still plenty of room for further modifications and developments both to the manual and the associated learning materials.

The courses for which this manual has been designed are skill and practice oriented in order to develop the new skills, the health trainers are required to not only read, but more importantly, observe the skills in action, discuss the skills with the tutor or supervisor, and then practice the skill. Feedback is a critical component of the successful development of new skills, and so evaluation formats are included for every skill, and feedback is given by peers and supervisors as well as self evaluation.

The manual is not complete on its own, and cannot be used as a reference book. Some source material is included for each skill. But trainers are encouraged to read more extensively and more current literature. A bibliography is offered at the end of each section,and includes only readings that are currently and readily available to trainers in the programme.

Other materials are also important to the success of this programme. Films cassette and sample materials are available and should be used in conjunction with the manual. Eventually it is hoped that some videotapes may be made available to supplement the audio-taped material, but it is important to note that cassette audiotapes seem, after trials, to be the appropriate level of technology in Africa at the present time.

What the manual cannot achieve on its own is the adequate supervision and practice of the skills. It is hoped that the implementation of the programme ensures sufficient opportunities for trainers to try out the skills including the context of the relevant health training programmes. I am aware that one of the possible weaknesses of this manual lies in the fact that it is not set into the context of any particular subject area. The trainers themselves have to supply the context themselves within their microteaching groups and in their teaching practice groups. But conversely a strength of the trainer working together in multidisciplinary multinational groups, lies in the new insights the health trainers obtain by working outside their original and familiar working context. In these multidisciplinary groups the trainers have come to examine their own assumptions across a broad range of activities.

Another limitation of this manual is the difficulty of locating the necessary material. Sufficient time was not available to make an index, but it is hoped that the comprehensive list of contents makes it sufficiently usable for the purpose for which it was designed.

This volume or part covers the first three units of the teaching skills courses - observing teaching, microteaching skills and teaching methods. Volume (Part) two covers the use of instructional media, teaching practice and the guides for teachers of the various units.

Where there are extracts from other publications as source material, some figures or references where not considered appropriate have been ommitted. Alterations to the texts have not otherwise been made.

There are many excellent publications already available for teachers and the publication of this manual is not intended to reinvent the wheel, but to fill the gaps left by these other publications Specifically recommended for health trainers are:

Abbatt F. Teaching for Better Learning. WHO Geneva 1980.

Cox & Ewan The Medical Teacher Churchill Livingstone, London, 1982.

Guilbert J - J Educational Handbook for Health Personnel. WHO. Geneva revised edition, 1982.

Werner, D & Bower, B. Helping Health Workers Learn, Hesperian Foundation 1982.

ACKNOWLEDGEMENTS

I wish to acknowledge the support and generosity of the Australian High Commission in Kenya who donated the money for the Microteaching Unit at Medical Training Centre, Nairobi. The money has gone towards the purchase of cassette tape recorders, tapes and the production of manuals to go with the tapes. Without this assistance there would have been no materials for developing microteaching for health trainers.

We are also grateful for permission from Churchill Livingstone to reproduce material on pages 39 - 41, 67 - 73, 115 - 122, 126 - 133, 139 - 141, 174 - 179 which is drawn from their publication The Medical Teacher. Similarly permission from Sydney University Press to reproduce material on pages 44 - 47, 51 - 55, 59 - 62, 77 - 81, 85 - 91. taken from Series 1 and 2 Handbooks of Sydney Microskills course. Permission from Addison Wesley to print the extract on pages 10 - 18 is also acknowledged, and from Harper & Row for the extract from Looking in Classrooms on pages 2 - 7.

The production of this manual would not have been feasible without the help of the graduates of the Diploma in Education (Health Professions) who have used the material in early draft form and suggested improvements. Not least of all, they have then taught the units using the manual, which again helped to improve it enormously. I have not had the time to test the manual since the revisions, so it is not perfect but that is my fault not theirs.

The typing of the first through to the final drafts has been a real headache. My thanks go to the typists Beth Nzoka, Priscilla Mwolo, Daphne Backhurst and Margaret Kyangwa who all helped produce the various stages of the manual.

My thanks go also to the many friends who helped in various ways, although they may not have realised it!

J. Griffiths.
MTC, Nairobi October 1982.

UNIT ONE

OBSERVING TEACHERS AND LEARNERS

UNIT ONE: OBSERVING TEACHERS AND LEARNERS

OBJECTIVES

That the student teacher will:

Observe, record and analyse interactions between teachers and learners using specific interaction analysis systems;

draw conclusions about patterns of teaching that exist in learning institutions;

relate the findings to existing research in the field of education, with specific reference to teacher styles, styles of leadership;

increase their awareness of teaching styles and behaviour as a precondition to analysing and developing their own teaching behaviours.

LEARNING ACTIVITIES

READING	Locate and read several articles/books related to teacher behaviour, teaching styles, interaction analysis. Attach a bibliography of material read to the report.
OBSERVATION	Observe teachers and students in several different institutions. A minimum of eight interactions should be observed and recorded using the various interaction analysis schedules in this manual.
ANALYSIS	Analyse the recorded data. We suggest that several of you pool your *analysed data* in order to broaden your data base.
REPORT	Compile a report that summarises the findings. It should be clear and concise, and not exceed 1,500 words. It should include: Which categories of behaviour are most often used by teachers. Are there any consistent patterns of teacher behaviour either between institutions or within institutions? When asking questions, what kinds of questions are most frequently used? Who asks them? Do teachers vary in leadership style? Do your findings agree with other research findings? Can you offer any explanation of the phenomena you are seeing?

EVALUATION

The achievment of the objectives will be measured in the report submitted by each student. The report will be assessed in the following terms:

1) Is it clear and concise?
2) Does it indicate that some of the critical reading material has been read and understood?
3) Have reasonable conclusions about teachers behaviour been made?

4) Is there any attempt to relate the study findings to other research findings?

CLASSROOMS ARE BUSY PLACES

Teachers lead busy lives. It has been pointed out that in a single day a teacher may engage in more than one thousand interpersonal exchanges with students (Jackson 1968). A study of four sixth-grade teachers found that they averaged 80 initiations with individual students each hour (Jackson and Lahaderne, 1967). In addition to initiation exchanges, these teachers were always responding to questions and moving from location to location. Teachers engaging in so many contacts will be hard pressed to keep track of the number and the substance of contacts that they share with each pupil. It may not be important for the teacher to remember all classroom contacts; however, recalling certain information (the ten students who didn't get a chance to present their class reports, that John had trouble with vowel sounds during reading, and so forth) may be very important.

Teachers must constantly respond to immediate needs. While teaching, they have little time to reflect upon what they are doing or planning to do, because they are busy reacting to the present situation. Unless teachers are looking for signs of student disinterest or difficulty, they may not see them. The teacher's world is literally consumed by immediate demands. Teachers are so absorbed in their present work that it is difficult for them to get a total perspective on what happens in their classrooms. Gloria Channon (1970), an elementary teacher in New York City, describes it this way:

The teacher, like the doctor in the midst of an epidemic, is so busy with the daily doings that she finds it hard to get some distance between herself and her functions, to see what is happening. As a result she is vulnerable to each day's experience in a special transient way.

Philip Jackson's book 'Life in Classroom' (1968) shows that teachers are so involved in classroom activities that they are hard pressed to explain specifically what they do or what they plan to do. The self-report data provided by teachers suggest that the demands of teaching leave little time for self-observation and analysis. If teachers cannot conceptualize classroom life before they enter the teaching profession, they will have little time to develop this ability later.

The teacher's world is filled not only with teaching demands, but also with supervisory and administrative functions. Teachers perform such diverse duties as supervising students on playgrounds and in lunch-rooms, talking with parents about the progress of their children, grading homework, duplicating assignment sheets, collecting money, and filling out forms. Channon (1970) specifies additional duties that many teachers must perform:

She works like a dog. She fills out reading cards and duplicates office records, book inventories, lunch lists, class photo lists, state census forms, report cards, reports by the hundreds . . . . she writes lengthy anecdotal records and case history forms for the guidance councellors.

Thus, classrooms are busy places. The hectic pace of classroom life interferes with the teacher's ability to see classroom behaviour - their own and that of the students. A number of books written by former and current teachers have appeared in print during the past few years. Although these books often emphasize the negative, they do present excellent analyses of problems that exist in some classrooms. The authors often suggest that they were not trained to see and respond to what was happening in the classroom, instead they were supposed to act. In particular, Herbert Kohn's '36 Children' (1967) and John Holt's 'How Children Fail' (1964) dramatically show that the first step in the authors' changing their teaching behaviour was becoming aware of what they were really doing. We shall return to this point later in the chapter to show that researchers have reached a similar conclusion.

CLASSROOM AWARENESS

What proof do we have that teachers are unaware of or misinterpret their behaviour in classrooms? Some particularly revealing information is provided by the minicourse training experience at the Far West Educational Development Laboratory (Borg et al., 1970). That laboratory has prepared a number of in-service courses designed to help teachers develop specific teaching skills. For example, their minicourse on independent work activity is designed to help teachers develop appropriate skills for (1) discussing with pupils the meaning of working alone, (2) discussing the assigned independent learning task, (3) eliciting potential problems and solutions, (4) establishing standards for what to do when finished, (5) providing delayed response to completed student work, and (6) evaluating pupils' success in working independently. These points are clearly specific, and at first glance it would appear that teachers would know if they had performed such behaviours in their teaching. Such was not the case. Borg et al. (1970) wrote.

The questionnaire data revealed that the majority of teachers thought they had used most of the skills presented in Minicourse 8 in the precourse lesson. The observational data does not support this belief. The same phenomena have been observed in evaluation of other minicourses; teachers often believe that they use a particular set of skills prior to taking the course, but an objective analysis of the data shows that this is not usually true.

If teachers are unaware of their performance when teaching small groups of students in minicourse laboratory sessions, it is unlikely that they could accurately describe their behaviour when teaching an entire class. Evidence that classroom teachers misinterpret their teaching behaviour has been presented by Emmer (1967). He reports that teachers were unable to describe accurately even simple classroom behaviours, such as the percentage of time that they and their students talked.

More information to show that teachers misperceive their behaviour at times is provided by Ehman (1970). In this study, ratings of teacher behaviour made by students and by classroom observers were highly similar. Ratings of the same behaviour made by the teachers themselves, however, differed sharply from the other two sets of ratings. The teachers could not accurately describe what they did in the classroom.

Discrepancies between teacher and student perceptions concerning the number of opportunities that students have for decision making have been

reported by Wolfson and Nash (1969). Teachers consistently perceived students to be making many more decisions than students saw themselves making.

The six studies reported here demonstrate that teachers sometimes behave in ways of which they are unaware. In the following section, we will present a few studies that describe how teachers behave in classrooms. We do not have proof that teachers are unaware of the behaviour described in these studies. Nevertheless, given the goals that teachers verbally express and the current training philosophy at teacher education colleges, it seems likely that teachers are not behaving in accordance with their intentions.

TEACHER DOMINATION

Researchers have noted that teachers monopolize communication in the classroom. Adams and Biddle (1970) concluded that teachers were the principal actors in 84 percent of classroom communication episodes. Hudgins and Ahlbrand (1969) reported figures very similar to those obtained by Adams and Biddle. This suggests that teachers monopolize classroom discussions, even though most teachers do not want to do this and are not aware that they do it. Perhaps teachers behave this way because they do not know how to solicit extended pupil talk.

Students are not as free to act as teachers believe them to be. Jackson and Wolfson (1968) vividly demonstrate the number of constraints that interfere with the wants and needs of nursery-school children. Not all the constraints they report are due to teacher behaviour. Many resulted when one child interfered with the goals of another child. Jackson and Wolfson concluded that about 20 constraining episodes occurred each minute in a group of 97 children. Bown had this to say about data that Jackson had collected in nursery schools:

.... he found that the kids were actually free to initiate and carry through an action only 5 percent of the time ... 95 percent of the youngsters' actions were essentially dictated. Now this is astounding and kind of unbelievable. I don't think a teacher could believe that she was doing this. I'm sure it would not correspond with the intellectual intent.

Bown also reported data drawn from video tapes of experienced teachers. He found that the average student in the sample made an independent, self-initiated statement about once every three weeks!

The extent to which this sample of teaching is representative of teaching in general in unknown. Data indicate, however, that teachers emphasize short factual questions and that this pattern has not changed much over time. Stevens (1912) looked in high-school classes and found that two-thirds of the questions asked by teachers were factual recall. Haynes (1935) looked at sixth grade history classes and reported that 77 percent of the questions were factual questions. Gallagher (1965) found that even teachers of gifted students asked many factual questions. More than 50 percent of their questions were cognitive memory questions. Davis and Tinsley (1967) studied student teachers teaching high-school social studies classes and reported that roughly 50 percent of the questions required factual answers. Guszak (1967) found that 14 percent of the teacher questions in reading groups merely asked students to locate information in the book, and another 57 percent were short-answer fact questions.

Borg et al., (1970) summarized this literature and suggested that the types of questions teachers ask pupils have not changed in more than half a century, despite an increased emphasis upon the need for a variety of questions (Groisser, 1964; Sanders, 1966). Factual questions are needed, especially to see if students have the basic information that is neccessary before useful discussion can take place. However, teachers use many more fact questions than they probably realize.

The studies in this section were reviewed to suggest that teachers are probably more directive than they realize. In the following section, we will present data showing teachers' classroom behaviour to be uneven, with different students receiving different teacher treatment. Such differential and often discriminatory teacher behaviour occurs partly because teachers are not aware of their behaviour, or because they do not realize its consequences

OTHER TEACHER BEHAVIOUR

The teacher is the principal actor in the classroom. When teachers do allow students to speak, however, which ones do they call upon? Jackson and Lahaderne (1967) indicated that child contact with the classroom teacher varies widely within the same classroom. Looking in four sixth-grade classrooms for roughly ten hours each, they found that teachers interacted with some students as few as 5 times and with others as often as 120 times. In addition, the sex of students affects the quantity and quality of the communication patterns they share with teachers. Boys have more interaction with teachers than girls. The magnitude of this ratio varies with the nature of the communication, being greatest for disciplinary exchanges and smallest for instructional messages. In both elementary and secondary classrooms, males are more salient to the teacher and receive much more criticism than females (Meyer and Thompson, 1956; Lippit and Gold, 1959); Jackson and Lahaderne, 1967).

Apparently students' achievement level, as well as their sex, figures heavily in whether or not they respond frequently. Good (1970) and Kranz et al. (1970) found that high achieving elementary students received more questions and praise than low-achieving students. Mendoza, Good and Brophy (1972), Jones (1971, and Horn (1914) reported high-achieving students in secondary schools received more response opportunities than low-achieving students. Good, Sikes and Brophy (1972) reported that in comparison to other students, low-achieving males in junior-high classrooms received inferior treatment, while high-achieving males received more frequent and more favourable contact with the teachers.

In addition to differences in the frequency of teacher contacts with students the quality of interaction varies with the achievement level of the student. Rowe (1969) found that teachers waited significantly longer for more capable students than for less apt students before giving the answer or calling on another student. Slower students had to respond more quickly to avoid losing their turn. Rowe also reported that these results surprised the teachers who were not aware that they were behaving in this fashion. One of the teachers, after being told of the results of the study, said "I guess we just don't expect an answer, so we move on to someone else".

Brophy and Good (1970b) studied the classroom behaviour of four first-grade teachers towards high-and low-achieving students. They reported

only minor differences in the frequency of teacher contact with students of differing achievement levels, but found important variations in the quality. Teachers were much more likely to praise high-achievement students, even when differences among the students in the correctness of their answers were taken into account.

When high-achieving students gave a right answer, they were praised 12 percent of the time. Low achievement students were praised only 6 percent of the time following a right answer. Even though they gave fewer right answers, low-achieving students received proportionately less praise. Similarly, low-achieving students were more likely to receive teacher criticism for a wrong answer. They were criticised 18 percent of the time, and high achievers were more likely to stay with high-achieving students (repeat the question, provided a clue, asks a new question) when they made no response, said "I don't know," or answered incorrectly. In contrast, they were more likely to give up on low-achieving students (give the answer or call on another student) under similar circumstances. The teachers were twice as likely to stay with high-achieving students as they were to stay with low-achieving students. These results, in combination with Rowe's data, suggest that some teachers will expect and demand performance from high-achieving students but give up on low-achieving students and accept only minimal performance.

In subsequent work by Good and Brophy (1974), with different teachers drawn from different schools, the teachers were surprised and shocked when told what they had been doing. Besides giving up easily with low-achievers, some teachers consistently gave up on some high-achievers more often than on others. Again, the teachers were not aware of this behaviour and had no ideas as to why they did it. It is difficult for teachers to monitor the quality of their interactions with students (as opposed to the frequency or quantity of interactions). By quality, we mean the way teachers interact with students. (What type of questions do they ask, hard ones or simple ones? How long do they wait for students to respond? Do they praise the students when they respond? Do they probe for more information or give the answer?).

It is important to note that not all teachers behave in different fashion towards high-and low-achieving students. After reviewing a number of our own studies and the work of others, it becomes apparent that the extent to which teachers are influenced by expectations and treat low-achievement students inappropriately varies widely from teacher to teacher. Many teachers develop expectations for low-achievers and treat them fairly (Brophy and Good, 1974). Many others, especially those who are unaware of their behaviour, have difficulty

Sometimes, the way a teacher groups students influences the flow of communication. Adams and Biddle (1970) discovered the existence of an action zone in the classroom. This action zone included the students who sat in the middle-front-row seats and in seats extending directly up the middle aisle. These students received more opportunity to talk than the others, possibly because the teachers tended to stand in front, where their attention was focussed on the students in immediate view. In any case, the students seated in this section of the classroom received more teacher attention.

Other seating patterns can influence the flow of communication and affect peer relations. Teachers often group students by ability in order

to reduce the range of individual differences within each group and to instruct more effectively. Sometimes, teachers completely segregate classroom seating patterns on the basis of student ability. The top readers sit at the same table, the next best group sit together, and so on. This can be carried to such rigid extremes that there is little contact between high-achievement and low-achievement students. This is likely to set up status differences among students and engender an attitude of inferiority in low-achievers that will alienate them from the mainstream of classroom life.

Rist (1970) presents a distressing longitudinal case study of one group of children progressing from kindergarten through second grade. Teachers created a caste system within this group of students. The high status children mirrored the behaviour of their teachers and communicated disrespect for the low-status children. Students who needed the most teacher help, those who were shy and not very verbal were seated in the rear of the room when they began kindergarten. This made it difficult for them to have contact with the teacher. The teacher was not aware that the placement of these children in the rear of the room would reduce their contacts with her and slow their classroom progress, but this is what happened. Such rigid grouping patterns also prevent low-achieving students from learning from their classmates when given the opportunity to do so (Coleman et al., 1966).

Many of the studies reviewed above suggest that teachers can improve their contact patterns with low-achievement students. If low-achievers are are relatively ignored and treated with second-class status, they will progressively fall further behind their peers the longer they stay in school. Physical separation of students into rigid groups increases the probability that the teacher will treat them differently, with low-achievement students being treated less appropriately. Much of this will be done unwittingly by teachers, but it will be done nevertheless.

Teaching is more likely to be effective if teachers' goals and classroom behaviour are in agreement. We have suggested that often there is a gap between what teachers do and what they think they do or want to do. There is no such thing as the appropriate teaching style. The correctness of an indirect or direct teaching style depends upon the objectives of the learning exercise and to some extent the personality of the teacher and the characteristics of the students themselves. However, if goals and teaching behaviour aren't in agreement, teaching will be ineffective.

(Extracted from Good & Brophy *Looking in Classrooms*, Harper & Row 1978, pp.19 - 27).

* * * * * *

FURTHER READING

There is a bibliography at the end of this unit. Do more reading into different interaction analysis systems. What information has been generated? What has been the value of undertaking classroom observations? How do teachers behave towards different kinds of students? How do teachers react to being observed? How have teachers' behaviour patterns been changed as a result of observation and analysis systems?

OBSERVING BEHAVIOUR

The case for observing teacher behaviour has been firmly established by now. But observing interactions is not an easy task. There are also specific rules for using the Flanders System which are described in the next article by Amidon and Flanders (1963), but there are some general things that any observer of human behaviour should take into account when observing, particularly when teachers are not used to being observed.

Practice the interaction analysis system before entering the classroom.
Although you will improve very quickly with practice, make sure that you know which I.A.S. (interaction analysis system) you are going to use and why, before the session. This will make your observation efficient and meaningful to you.

If a category of behaviour continues apparently continuously, continue to record.
If you stop when a steady pattern is emerging, then the validity of the whole record is distorted. Remember you are a human camera, and as such, don't switch off when you are bored!

Obtain the permission of both the school and the teacher concerned.
It is unfortunately true that most institutions and their teachers are suspicious and negative towards anything they consider might be critical of them, or merely evaluative! Evaluation of this sort is rarely done in our institutions and the attitudes you meet may depress you. However, persevere in establishing a good rapport by being open, positive and supportive, and be prepared to explain the A.I.S. you are going to use.

Provide some form of feedback to those you have observed.
Either discuss the matrix results or give a written summary of your findings to the institution. This helps to allay negative feelings, and the actual information about their own behaviour can provide positive incentives to particular teachers.

Don't worry about your presence having an effect on the observations.
It is true that your presence will have some effect, but over a period of time (even half an hour) the effect is minimal, and students particularly soon forget that you are there. The effect on the teacher is probably more, but they will only try to impress you positively so you will be seeing them at their best!

Sit where you can see and hear what is happening easily.
This makes it easier for you to record your observations accurately, but it also means that the students and teachers can also easily see you. If they can see what you are doing, they quickly lose their curiosity about what you are doing, and concentrate on the learning experience.

OBSERVING GENERAL PATTERNS OF TEACHER BEHAVIOUR

The first observations and analyses should focus on general patterns of teacher behaviour, and you should use Flanders Interaction Analysis System. This is described in detail in the following pages, which you should read before attempting to actually do any observation and recording. Trial observations and recording is a good idea before venturing into the classroom.

OBSERVING STUDENT CONTRIBUTIONS

At this point you should be observing only the students. This observation schedule examines the qualitative nature of what students are doing in more detail than the Flanders system. Consider in your analysis why student contributions fall into the particular pattern that you have seen.

OBSERVING LEADERSHIP STYLE

Much of the teaching function consists of leadership exercised in various forms, and possibly in different ways by teachers in different situations. There has been quite a lot of research done into the relationship of teachers leadership style and student performance, but at this point the objective is to identify what leadership styles can be seen here. Later you should consider what leadership style you feel that you yourself tend to use? In what situations is this most effective? What are the limitations of any particular style of leadership?

INTERACTION ANALYSIS AS A FEEDBACK SYSTEM[1]

EDMUND AMIDON and NED FLANDERS

The social forces at work in the classroom are so complex that it looks on the surface as if any attempt to analyze them would be extremely difficult. The teachers' interaction with children, which is a portion of the total social process, seems almost as difficult to identify. Nevertheless, teacher-pupil contacts have been classified into specifically defined behavioural acts by various researchers who have studied teacher behaviour.

The Flanders system is concerned with verbal behaviour only, primarily because it can be observed with higher reliability than can nonverbal behaviour. The assumption is made that the verbal behaviour of an indvidual is an adequate sample of his total behaviour.

DESCRIPTION OF CATEGORIES

In the Flanders system of interaction analysis all teacher statements are classified first as indirect or direct. This classification gives central attention to the amount of freedom the teacher grants to the student. In a given situation, therefore, a teacher has a choice. He can be direct, that is, minimizing the freedom of the student to respond, or he can be indirect, maximizing the freedom of the student to respond. His choice, concious or unconscious, depends on many factors, among which are his perceptions of the situations and the goals of the particular learning situation.

In order to make total behaviour or total interaction in the classroom meaningful, the Flanders system also provides for the categorizing of student talk. A third major section, that of silence or confusion, is included in order to account for the time spent in behaviour other than that which can be classified as either teacher or student talk. All statements that occur in the classroom, then, are categorized in one of three major sections: (a) teacher talk, (b) student talk, and a seperate category, (c) silence or confusion, used to handle anything else that is not teacher or student talk.

The larger sections of teacher or student verbal behaviour are subdivided in order to make the total pattern of teacher - pupil interaction more meaningful. The two subdivisions for teacher verbal behaviour; indirect and direct teacher talk, are further divided into smaller categories. Indirect influence consists of four observation categories: (1) accepting feeling, (2) praising or encouraging, (3) accepting ideas, and (4) asking questions. Direct influence is divided into three categories: (5) lecturing, (6) giving directions, and (7) criticizing or justifying authority. Student talk is divided into only two categories: (8) responding to teacher, and (9) initiating talk. All categories are mutually exclusive, yet totally inclusive of all verbal interactions occurring in the classroom.

[1] Extracted from Edmund Amidon and Ned Flanders, *The Role of the Teacher in the Classroom*. Minneapolis: Paul S. Amidon and Associates, Inc., 1963.

INDIRECT TEACHER BEHAVIOUR

CATEGORY 1. ACCEPTANCE OF FEELING. The teacher accepts feelings when he says he understands how the children feel, that they have the right to have these feelings, and that he will not punish the children for their feelings. These kinds of statements often communicate to children both acceptance and clarification of the feeling.

Also included in this category are statements that recall past feeling, refer to enjoyable or uncomfortable feelings that are present, or predict happy or sad events that will occur in the future.

In our society people often react to expressions of negative feelings by offering negative feelings in return. Acceptance of these emotions in the classroom is quite rare; probably because teachers find it difficult to accept negative emotional behaviour. However, it may be just as difficult for them to accept positive feelings. Feelings expressed by students may also be ignored by the teacher if he considers the classroom to be a place where people are concerned primarily with ideas rather than feelings.

CATEGORY 2. PRAISE OR ENCOURAGEMENT. Included in this category are jokes that release tension, but not those that threaten students or are made at the expense of individual students. Often praise is a single word: "good", "fine", or "right". Sometimes the teacher simply says, "I like what you are doing". Encouragement is slightly different and includes statements such as, "Continue". "Go ahead with what you are saying". "Uh, huh; go on; tell us more about your idea".

CATEGORY 3. ACCEPTING IDEAS. This category is quite similar to category 1: however, it includes only acceptance of student ideas, not acceptance of expressed emotion. When a student makes a suggestion, the teacher may paraphrase the student's statement, restate the idea more simply, or summarize what the student has said. The teacher may also say, "Well, that is an interesting point of view. I see what you mean". Statements belonging in Category 3 are particularly difficult to recognise; often the teacher will shift from using the student's idea to stating the teachers own idea.

Statements belonging in category 3 can be identified by asking the question, "Is the idea that the teacher is now stating the students or is it the teachers?". If it is the student's idea, then this category is used; if it is the teacher's, another category must be employed.

CATEGORY 4. ASKING QUESTIONS. This category includes only questions to which the teacher expects an answer from the pupils. If a teacher asks a question and then follows it immediately with a statement of opinion, or if he begins lecturing, obviously the question was not meant to be answered. A rhetorical question is not categorized as a question. An example of another kind of question that should not be classified in category 4 is the following: "What in the world do you think you are doing out of your seat, John?". With proper intonation the question is designed to get John back in his seat; if such is the case, it must be categorized as criticism of the student's behaviour (Category 7).

Questions that are meant to be answered are of several kinds. There are questions that are direct in the sense that there is a right and a wrong answer. The question, "What are 2 and 2?" is a question that limits the

freedom of the student to some extent. Although he can refuse to answer, give the wrong answer, or make a statement of another kind; in general, this kind of question focuses the student's answer more than a question such as, "What do you think we ought to do now?". Questions, then, can be very broad and give the student a great deal of freedom in answering. All questions, however broad or narrow, which require answers and are not commands or criticism, fall into category 4.

DIRECT TEACHER BEHAVIOUR

CATEGORY 5. LECTURE. Lecture is the form of verbal interaction that is used to give information, facts, opinions, or ideas to children. The presentation of material may be used to introduce, review, or focus the attention of the class on an important topic. Usually information in the form of lecture is given in fairly extended time periods, but it may be interspersed with children's ideas

Whenever the teacher is explaining, discussing, giving opinion, or giving facts or information, category 5 is used. Rhetorical questions are also included in this category. Category 5 is the one most frequently used in classroom observation.

CATEGORY 6. GIVING DIRECTIONS. The decision about whether or not to classify the statement as a direction or command must be based on the degree of freedom that the student has in response to teacher direction. When the teacher says, "Will you all stand up and stretch?", he is obviously giving a direction. If he says, "John, go to the board and write your name", he is giving a direction or command. When he says, "John, I want you to tell me what you have done with your reader", he is still giving a direction.

CATEGORY 7. CRITICIZING OR JUSTIFYING AUTHORITY. A statement of criticism is one that is designed to change student behaviour from non- acceptable to acceptable. The teacher is saying, in effect, "I don't like what you are doing. Do sometning else". Another group of statements included in this category are those that might be called statement of defence or self- justification. These statements are particularly difficult to detect when a teacher appears to be explaining a lesson or the reasons for doing a lesson to the class. If the teacher is explaining himself or his authority, defending himself against the student, or justifying himself, the statement falls in this category. Other kinds of statements that fall in this category are those of extreme self-reference or those in which the teacher is constantly asking the children to do something as a special favour to the teacher.

Categories 1 through 4, those of indirect teacher influence, and categories 5 through 7, those of direct teacher influence, have been described. They are all categories of teacher talk. Whenever the teacher is talking, the statements must be categorized in one of the first seven categories. If the observer decided that with a given statement the teacher is restricting the freedom of the children, the statement is tallied in categories 5, 6, or 7. If on the other hand, the observer decides that the teacher is expanding freedom of children, the category used is either 1,2,3, or 4.

There are three additional categories for use in classroom interaction.

STUDENT BEHAVIOUR

CATEGORY 8. STUDENT TALK: RESPONSE. This category is used when the teacher has initiated the contact or has solicited student statements, when the student answers questions asked by the teacher, or when he responds verbally to a direction the teacher has given. Anything that a student says that is clearly in response to initiation by the teacher belongs in category 8.

CATEGORY 9. STUDENT TALK: INITIATION. In general, if the student raises his hand to make a statement or to ask a question when he has not been prompted to do so by the teacher, the appropriate category is 9.

Distinguishing between Categories 8 and 9 is often difficult. Predicting the general kind of answer that the student will give in response to a question from the teacher is important in making this distinction. If the answer is one that is of a type predicted by the observer (as well as the teacher and class), then the statement comes under category 8. When in response to a teacher-question the student gives an answer different from that which is expected for that particular question, then the statement is categorized as a 9.

OTHER BEHAVIOUR

CATEGORY 10. SILENCE OR CONFUSION. This category includes anything else not included in the other categories. Periods of confusion in communication, when it is difficult to determine who is talking, are classified in this category

A summary of these categories, with brief definitions for use of the observer, can be found below:

TEACHER TALK	1.	Accepts feeling: accepts and clarifies the feeling tone of the students in a non-threatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
Indirect Influence	2.	Praises or encourages: praises or encourages s student actions or behaviour.
	3.	Accepts or uses ideas of student: clarifying ideas
	4.	Asks questions: asking a question about content or procedure with the intent that a student answer.
Direct Influence	5.	Lectures: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
	6.	Gives directions: directions, commands, or orders with which a student is expected to comply.
	7.	Criticizes or justifies authority: statements, intended to change student behaviour from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.
STUDENT TALK	8.	Student talk- response: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.
	9.	Student talk-initiation: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
SILENCE	10.	Silence or confusion: pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

PROCEDURE FOR CATEGORIZING TEACHER-PUPIL INTERACTION

The Flanders system of interaction analysis was originally used as a research tool and continues to serve this function. As such, it is employed by a trained observer in order to collect reliable data regarding classroom behaviour as part of a research project.

The system is also useful as an in-service training device for teachers. It may be employed by a teacher either as he observes someone else teach or as he categorizes a tape recording of his own classroom behaviour. In either case the method is the same.

Every three seconds the observer writes down the category number of the interaction he has just observed. He records these numbers in sequence in a column. He will write approximately 20 numbers per minute; thus, at the end of a period of time, he will have several long columns of numbers. The observer preserves this sequence of numbers that he has recorded. It is important to keep the tempo as steady as possible, but it is even more crucial to be accurate. He may also wish to write down marginal notes from time to time, which can be used to explain what has been happening in the classroom.

No matter whether he is using a live classroom or a tape recording for his observations, it is best for the observer to spend five to ten minutes getting oriented to the situation before he actually begins to categorize. He then has a feeling for the total atmosphere in which the teacher and pupils are working. After he has begun to get the feeling of the classroom interaction, he begins to record the interaction.

The observer stops classifying whenever the classroom activity is changed so that observing is inappropriate as for instance, when there are various groups working around the classroom, or when children are working on workbooks or doing silent reading. He will usually draw a line under the recorded numbers, make a note of the new activity, and resume categorizing when the total class discussion continues. At all times the observer notes the kind of class activity he is observing. The reading group in the elementary school is obviously different from an informal discussion period, a review of subject matter, a period of supervised seat work, teacher-directed discussion, introduction of new material, or evaluation of a completed unit. Such diverse activities may be expected to show different types of pupil-teacher interaction even when guided by the same teacher. A shift to new activity should also be noted.

GROUND RULES

Because of the complexity of the problems involved in categorization, several ground rules have been established. These rules of observation aid in developing consistency in trying to categorize teacher behaviour. They have been useful in working in classrooms with all subject areas and at all grade levels.

RULE 1: *When not certain in which of two or more categories a statement belongs, choose the category that is numerically farthest from category 5.* This is true except when one of the two categories in doubt is category 10, which is never chosen if there is an alternative category under consideration.

Because those categories farthest from the centre (5) of the category system occur less frequently, the observer maximizes information by choosing the less frequently occurring category (excepy 10) when there is a choice. For example, if the observer is not sure whether it is a 2 or 3, he chooses 2. If in doubt between a 5 and a 7, he chooses a 7, etc.

RULE 2: *If the primary tone of the teacher's behaviour has been consistently direct or consistently indirect, do not shift into the opposite classification unless a clear indication of shift is given by the teacher.* The trained observer is in the best position to judge whether or not the teacher is restricting or expanding the freedom of action of class members. If the observer feels that the teacher's pattern of behaviour is generally one of expanding the freedom of students to act, a slightly more direct statement in a very indirect pattern may tend to look, in contrast, like a more direct statement than it actually is. On the other hand, he must remain alert to shift as the teacher shifts momentarily to one of the more direct categories. Conversely, if the observer feels that the teacher has been consistently restrictive in his behaviour, he is particularly careful in his use of the indirect categories.

In observing this rule the observer is reacting to the general tone of the teacher's influence, either direct or indirect, and does not use the opposing categories unless it is clear that the teacher has shifted from this more general pattern. He must, of course, be certain that the teacher has established a direct or indirect pattern before he categorizes consistently in either of the two areas. Clearly he must also be ready to change when the teacher obviously moves all the way along the system; that is, to 1 or 2 from 6 or 7, or when the teacher moves all the way to a 6 or 7 from a 2 or a 3. This rule is often called the rule of the biased observer; that is, the observer is operating in a climate of general direct or indirect influence, and although he is ready to move to the opposite set of categories, he must feel that the teacher has definitely moved to the opposite type of influence before he is willing to grant a change in interaction pattern.

RULE 3: *The observer must not be overly concerned with his own biases or with the teacher's intent.* Rather, he must ask himself the question. What does this behaviour mean to the pupils as far as restriction or expansion of their freedom is concerned? If, when the teacher attempts to be clever, pupils see his statements as criticism of a pupil, the observer uses category 7, rather than category 2. If the teacher in being sarcastic says how good the children are, again category 7 is used. If a statement intended as a question has the effect of restricting student's freedom so that it becomes a direction, then it must be classified as a direction. The effect of a statement on the pupils, then, not the teacher's intent, is the crucial criterion for coding response.

This rule has particular value when applied to the problem of helping teachers to gain insight into their own behaviour. In trying to categorize their own tapes teachers comment, "But I meant ....", or "I was really trying to get the pupils to talk more", or "I think that I wanted them to answer that question", or "I was trying to praise them", or "I meant to use that child's idea". All these protests indicate that the teacher is thinking about his intent rather than the effect of his behaviour on the class members.

The meaning and value of this category system for an individual teacher come from the attention it gives to the effect of teacher behaviour

on the freedom of the class. Use of this criterion requires a great deal of training, particularly when a teacher is categorizing a tape of his own teaching. He must learn to be nondefensive about categorizing the behaviour, recognizing that there is absolutely no evaluation or good-bad orientation implied in the category system. The question is simply, "What category best describes this particular bit of interaction?"

RULE 4: *If more than one category occurs during the three-second interval, then all categories used in that interval are recorded;* therefore, record each change in category. If no change occurs within three seconds, repeat that category number. This rule is concerned with the situation in which statements from the two categories occur during a three-second period. Generally an observer writes down a category number every three seconds. The pace of recording is evenly maintained so that only one category number is written during this period.

However, if there is a change in categories during this interval, the observer records the change. Within the three-second interval, for example, The teacher may ask a question, the child answers, and the teacher praises the child. The observer records all three of the categories. The fourth rule,therefore, is that a category number is recorded every three seconds unless the teacher changes categories within the three second interval. If he changes categories, or if more than one category occurs during the three-second interval, then all categories used in the time period are recorded.

RULE 5: *If a silence is longer than three seconds, it is recorded as a 10.* (This rule is listed because observers tend to ignore short periods of silence.) The 10 is also used when two or more people are talking at once and when there is slight confusion in the classroom so that the observer cannot identify a single speaker. Breaks in the interaction in the form of silence or confusion are classified in category 10.

The importance of preserving the sequence when categorizing teacher statements was emphasized earlier in this paper. In this way the sequence of events in a classroom can be preserved for analysis.

There is a method of recording the sequence of events in the classroom in such a way that certain facts become readily apparent. This method consists of entering the sequence of numbers into a 10-row by 10-column table, which is called a matrix (see Figure 1). The generalized sequence of the teacher-pupil interaction can be examined readily in this matrix. The following example shows how an observer would classify what happens in a classroom and how the observations are recorded in the matrix. The example is a fifth-grade teacher who is beginning a social studies lesson. The observer has been sitting in the classroom for several minutes and has begun to get some idea of the general climate before he begins to record. The teacher says to the class, "Boys and girls, please open your social studies books to page 5". (Observer classified this as a 6, followed by a 10, because of the period of silence and confusion as the children try to find the page.) The teacher says, "Jimmy, we are all waiting for you. Will you please turn your book to page 5?'. (Observer records a 7 and a 6.) "I know now", continues the teacher, "that some of us had a little difficulty with, and were a little disturbed by, the study of this chapter yesterday; I think that today we are going to find it more exciting and interesting." (Observer records two 1's; reacting to feeling.). "Now, has anyone had a chance to think about what we discussed yesterday?" (Observer records a 4 for a question.). A student answers, "I thought about it, and it seems to me that the reason we are in

so much trouble in southeast Asia is that we haven't really had a chance to learn to understand the ways of the people who live there" (Observer records three 8's).

The teacher responds by saying,"Good, I am glad that you suggested that, John. Now let me see if I understand your idea completely. You have suggested that if we had known the people better in southeast Asia, we might not be in the trouble we are in today." (This is classified as a 2 , followed by two 3's).

The observer has now classified the following sequence of numbers in this fashion :

```
                10
                   )   1st pair
                 6
2nd pair       (
                10
                  )    3rd pair
                 7
4th pair       (
                 6
                 1
                 1
                 4
                10
```

(The use of a 10 at the beginning and end of the sequence is explained in the discussion that follows.)

Tabulations are now made in the matrix to represent pairs of numbers. Notice in the listing above that the numbers have been marked off in pairs. the first pair is 10 - 6; the second pair is 6 - 10; etc. The particular cell in which the tabulation is first made is determined by using the first number in the pair for the column . Thus , 10 - 6 would be shown by a tally in the cell formed by Row 10 and Column 6. The second pair , 6 - 10, would be shown in the cell formed by Row 6 and Column 10 . The third pair , 10 - 7 , is entered into the cell, Row 10 and Column 7. Notice that the pairs of numbers overlap with the previous pair, and each number, except the first and last, is used twice. It is for this reason that a 10 is entered as the first number and the last in the record. This number is chosen as it is convenient to assume that each record began and ended in silence. This procedure also permits the total of each column to equal the total of the corresponding row .

* * * * *

FIGURE 1 : PARTIALLY COMPLETE ANALYSIS MATRIX

	1	2	3	4	5	6	7	8	9	10	Total
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
Total											

When you have completed marking tallies onto the matrix you can calculate the percentage of interactions of any particular type, out of the total number of interactions observed , such as 50% of interactions were the direct influence of the teacher .

But the pattern of interactions has been preserved in the matrix, and tallies that look like the 'content cross' in Fig.2., indicate that the teacher was primarily concerned in giving information only. However , a pattern with a large concentration of tallies as in Fig.3. shows a teacher who is relying heavily on indirect influence, but is still dominating the interaction . Patterns of the sort seen in Fig.4. show either the students responding to the teacher or the teachers reaction to students initiatives or responses . It is these patterns of interactions which make Flanders' system such a valuable observation tool, and should provide the basis for your conclusions .

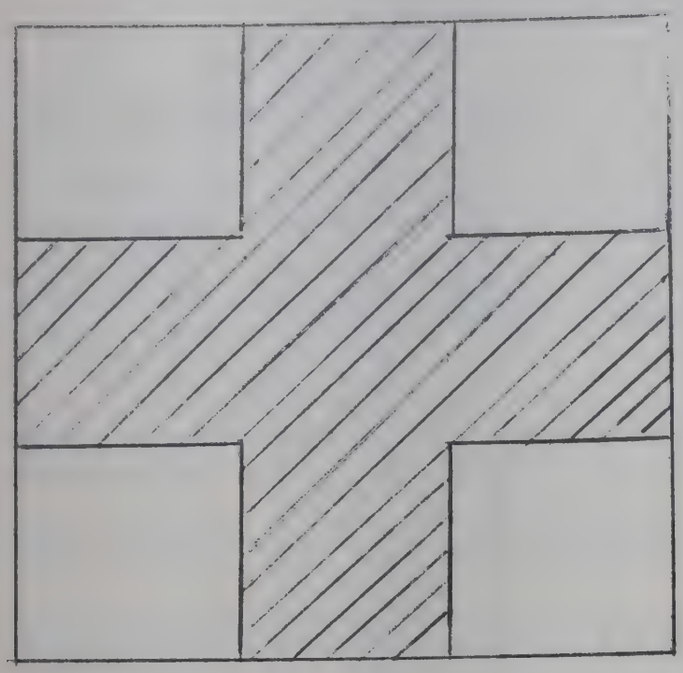

FIGURE 2 CONTENT CROSS

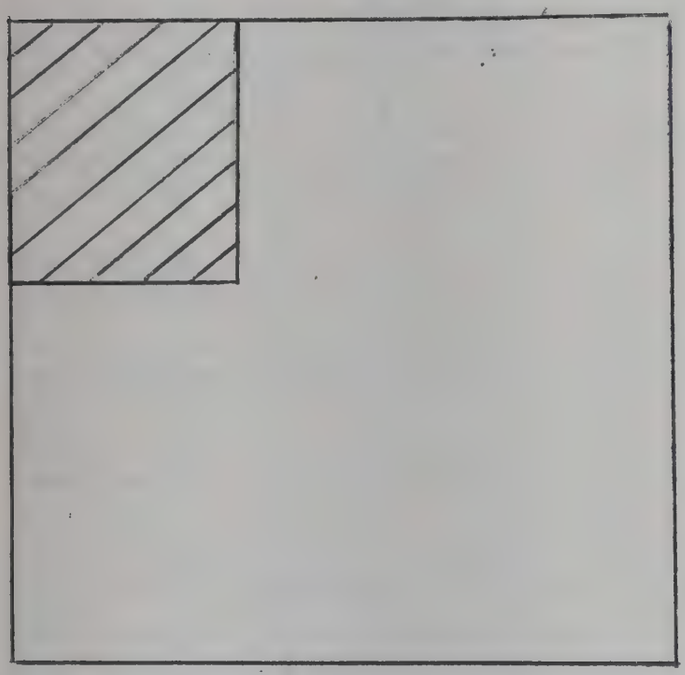

FIGURE 3 : TEACHER INDIRECT INFLUENCE

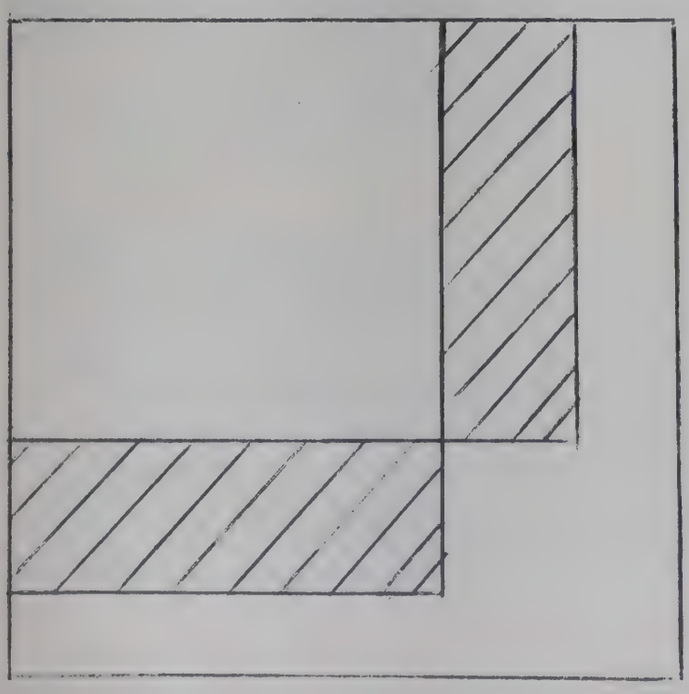

FIGURE 4 : STUDENT/TEACHER INTERACTION

ANALYSIS OF STUDENT CONTRIBUTIONS

The following analysis system is best used in small group teaching situations, such as tutorials. Since one of the goals of a tutorial is to help students learn through discussion and their own contributions, it is valuable to examine the exact nature of their contributions. in fact, student's contributions are less common than teachers would like to think. Broady (1970) describes two types of small group classes which are probably all too familiar to you.

In the first, the tutor meets the class. "Have you any questions?" he asks. Silence. The tutor says "These are dim students", while the students sit embarrassed and anxious and thus less ready to join in discussion. The second kind of seminar begins with one student reading a paper. The others relax, it's his worry, not theirs and it is doubtful if they will be pushed to make a contribution. So, the paper is read and the tutor poses questions to the student who has read it and discusses it with him, while the rest sit quietly and undisturbed by the tutor. Finally the viva voce ends; and once again silence, embarrassment and anxiety.

As this extract shows, tutorials all too often turn out to be boring or 'mini-lectures'.

The analysis system which analyses student contributions allows the observer to establish whether students are contributing information or opinions, whether they are asking questions or answering them and so on. It has been suggested that successful small group teaching does not simply happen, but needs to be planned. During any such session, factors such as patterns of interaction and style of working together that will either facilitate or hinder the achievement of the group's goals. Much of this will depend on the skill of the teacher, but initially it is valuable to observe how students do actually interact.

ANALYSIS OF STUDENT CONTRIBUTION IN CLASSROOM

Tick the appropriate box every time the students start to speak or offer an idea(s). Extended contributions in the same category should be given extra ticks (one every 30 seconds). If the person changes category, even if no one else has spoken, then tick the new box.

		CASE 1	CASE 2	CASE 3
Defines/clarifies problem.				
Asks for information.				
Gives information				
Asks for opinions				
Gives opinions				
Asks for solutions				
Proposes solutions				
Makes expressive contributions.	+ive e.g. encouraging, gate-keeping, following.			
	-ive e.g. criticizing, blocking, overtalking			
Not coded (including teacher contributions).				
Total				

(Adapted from G. Brown *"Analysing small group teaching"* in Cox & McEwan, *Medical Teacher* P.51.)

ANALYSIS OF LEADERSHIP STYLE

The kind of student contributions that you have observed, are, to a large extent, dictated by the leadership style exercised by the teacher, or in a student-led group, the student. What is the teacher's role in shaping the learning environment or atmosphere in the classroom? We cannot seriously doubt that the teacher carries much responsibility for the atmosphere. It can be easily demonstrated that the same students will respond to different teachers differently. The same class that is interested and attentive for one teacher can be difficult and bored with another.

The analysis system is based on a simple dichotomy model of leadership. Leadership is primarily identified as being either authorative in pattern or facilitative in pattern. Bennett's (1976) study showed some interesting conclusions about leadership style related to the achievement of students. It must be born in mind that the personal attributes of teachers will interact with their teaching style to determine the outcome (Good & Brophy, 1973). For instance, achievement oriented, introvert teachers will tend to have a style of leadership that is successful with achievement oriented and more introvert students, but less successful with extrovert students. During the use of this analysis system we are not advocating one style of leadership over another, but rather to look carefully at the styles of leadership being practiced in learning groups.

The system (Heron, 1976) is not easy to use, and is best used in small group teaching sessions.

ANALYSIS OF LEADERSHIP STYLE

Tick the appropriate box every time the person speaks. Extended contributions should be given extra ticks (one every 30 seconds). If the person changes category, even if no one else has spoken, then tick the new box.

AUTHORITATIVE	CASE 1	CASE 2	CASE 3
1. PRESCRIPTIVE - giving advice/direction being critical/evaluative offering judgements.			
2. INFORMATIVE - giving information/interpretation, being didactic.			
3. CONFRONTING - directly challenging attitudes/beliefs/actions.			
FACILITATIVE			
4. CATHARTIC - releasing tension encouraging laughter/ other emotions.			
5. CATALYTIC - eliciting information encouraging self-directed problem solving, being reflective.			
6. SUPPORTIVE - being approving/confirming/validating			

Calculate the Authoritative/Facilitative ratio.

(After Heron, J. A six category intervention analysis. *British Journal of Guidance and Counselling* 4: 143-155. 1976.)

DICUSSING BEHAVIOUR

CONCLUSIONS ABOUT VERBAL INTERACTION

Having used I.A.S. in a variety of educational or learning situations, you are now in a position to draw some conclusions. Whilst you may not have demonstrated in experimental terms that a certain situation seems to determine a particular interaction pattern, it is necessary to underline or highlight the phenomena that you actually have observed. Consider, between yourselves in discussion, the following possible conclusions:

* Do analysis patterns vary within any one learning institution? If not, why not?
* Are particular patterns associated with the size of the learning group?
* Can or do teachers vary their interaction pattern according to the learning objectives or to the subject matter?
* Are there consistent differences between different educational levels, such as between secondary and nursery schools?
* Do you think the teachers you observed were aware of their own behaviour and could control that behaviour in your presence?
* Did feedback to the teachers have any effect?

WRITING THE REPORT

WHAT SHOULD THE REPORT INCLUDE?

The scientific or technical report is a combination of a report of facts and an interpretation of those facts. Below is suggested an outline suitable for the writing up of this investigation or study.

a. TITLE. Should consist of a few words indicative of the contents that are most emphasized in the paper.

b. INTRODUCTION.
   1) The nature of the problem being investigated.
   2) The purpose and method of the investigation.

c. METHOD.
   1) Indication of how many sessions were observed, what level institution. Which particular institutions, classes, teachers were observed, using which I.A.S. (by drawing up a summary table to show this).

d. RESULTS.
   1) Brief summary of the analysis of each situation observed. (Draw tables where possible) Compare analyses between situations.

e. CONCLUSIONS.
   1) Generalizations of main conclusions that are shown by your results.
   2) Comparison of your results and interpretations with those of other researchers.

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UNIT TWO

MICROTEACHING

UNIT OBJECTIVES

By the end of this unit the teacher will be able to

* Plan and clearly demonstrate all the specified microteaching skills;
* Critically evaluate own performance on these skills;
* Critically evaluate performance of peers and provide clear and useful feedback.

LEARNING ACTIVITIES

These objectives can be achieved through

* Using the manual;
* Reading background material;
* Viewing listening to model tapes;
* Undertaking guided learning activities, such as exercises:
* Practising skills;
* Evaluating performance.

By using this workbook, necessary basic learning materials are presented in a logical form for the achievement of these objectives.

MICROTEACHING FOR TEACHER TRAINING[1]

BY RICHARD P. FOLEY

In response to student dissatisfaction with the traditional modes of training, medical educators everywhere have been engaged in thoughtful examination of faculty training programmes, since it has become increasingly evident that more systematic and economical methods are needed for helping teachers to acquire increased pedagogical skill.

One alternative to present teacher-training methods which has been widely applied by educators from other disciplines is *microteaching*. It is the purpose of this paper to describe the technique conceptually and operationally, and to offer suggestions for the incorporation of the method into schools for the health professions.

MICROTEACHING: a description

A graduate student in microbiology holds up an agar plate before four first-year medical students to demonstrate its use in isolating bacterial colonies. Fifteen feet away, a professor of microbiology who is supervising the teacher aims the camera of a videotape recorder at the group and occasionally writes down some notes. Although the teaching lasts for only 10 minutes, two significant things happen. The medical students have had an opportunity to learn one method of isolating bacterial colonies, and the teacher has had an opportunity to practice the instructional technique of presenting a laboratory demonstration. After the presentation is concluded, the supervisor asks each student to fill out a questionnaire regarding the teacher's performance. The students then leave the room and a 15-minute critique follows in which the supervisor and instructor discuss the demonstration, review the written comments of both supervisor and students, and view segments of the videotape. After a short break, during which the practice teacher has the opportunity to incorporate suggestions from the critique, the entire process is repeated with a different group of medical students. The teacher, the supervisor and the students have all been involved in a microteaching exercise.

Microteaching is designed for teachers who want to improve their teaching skills. The key elements of this training method, illustrated in the above example, include:

1. A CONTROLLED, CONSTRUCTED SETTING FOR PRODUCING INSTRUCTIONAL SKILLS. By reducing the length of the presentation, the scope of the content, and the number of students, the graduate student in microbiology can practice an instructional skill, such as giving a laboratory demonstration, in a setting free of many of the complexities of the actual classroom.

2. FEEDBACK FROM MULTIPLE SOURCES. After giving the 10-minute microlesson the teaching assistant is provided with suggestions of feedback for improving his performance from a content expert acting as the supervisor, from the students he has taught and from a videotape playback.

3. THE OPPORTUNITY FOR IMMEDIATE INTEGRATION AND APPLICATION OF FEEDBACK. After the feedback has been received there is an opportunity to integrate and apply these suggestions to a different group of medical students.

1. WHO/EDUC/76

Five essential propositions underlie microteaching as a training method:

1. THE MOST EFFECTIVE WAY TO MASTER THE SKILLS OF TEACHING IS TO PRACTICE ONE SKILL AT A TIME.

Too often a teacher may be informed by his department chairman, students, or colleagues that he needs to "liven up his lectures" or "allow" students more opportunity to "participate". Such advice is rarely helpful, for if the teacher knew how to deliver an exciting lecture or increase student involvement he would probably be doing so.

In microteaching, an individual wishing to improve his instructional effectiveness concentrates on the objective of practising a single instructional skill, mastery of a unique set of curricular materials, or demonstration of one teaching method. Focusing on specific objectives, rather than the teaching-learning process in general, allows a teacher to discriminate among the elements of teaching, and assists him in practising a particular technique and incorporating it in his behaviour. For example,if the objective of a health educator were to increase student participation in the classroom, he might concentrate on using positive verbal reinforcement (such encouraging comments as "Good", "Excellent", or other statements indicating satisfaction with the response); or non-verbal reinforcement (such actions as nodding his head affirmatively, smiling, or moving towards the student).

By concentrating on a particular skill, a teacher can begin to recognise the behavioural components of that technique and the situational factors which dictate their use. For example, the health personnel educator who has learned what kinds of verbal and non-verbal cues constitute reinforcement and how to use them can then employ this skill to bring about maximum participation. When a techer has mastered a variety of instructional techniques and knows the effect of each, he can apply them to achieve his instructional aims in a planned rather than a chance arrangement.

2. THE COMPLEXITIES OF THE ACTUAL CLASSROOM SITUATION LIMIT ITS VALUE IN THE TRAINING OF TEACHERS.

Most teachers learn how to teach on the job, but classroom practice has significant limitations. First, there is simply too little opportunity for trial and error. A beginning teacher, in particular, is often anxious about making a good impression on his students. Consequently, if his first lecture is a success and his first group discussion a failure, the chances are that he will become committed to the lecture method of instruction as the most effective way to teach. Secondly, there is only limited opportunity for a teacher to receive feedback on his performance in the classroom, and even that is rarely sought. Finally, and most important, students are in a classroom to be effectively taught, and not to be practised on.

Microteaching is designed to provide a safe setting for the acquisition or refinement of educational skills and techniques. A beginning teacher might find delivering a lengthy lecture to a large body of students an awesome task. Practising this method of instruction in a microteaching setting, where the class size, the time and the scope of content are reduced, considerably alleviates this anxiety. Rather than deliver a 50-minute presentation to a group of 75 students, he can concentrate on one aspect of the lecture, perhaps an introduction only, and practise this component in a five to 10-minute microlesson to a group of four or five students. Having mastered the introduction, he is ready to practise the body of the lecture and the conclusion. Since the students observing the

lesson would usually not be the teacher's he is freer to experiment and less anxious about receiving student feedback.

3. THE MORE KNOWLEDGE A TEACHER HAS OF HIS PERFORMANCE DURING A PRACTICE SESSION, THE MORE VALUABLE THE EXPERIENCE.

Supervision is generally equated with evaluation and therefore is regarded by many teachers as something to be avoided. This is unfortunate, since constructive supervision can be one of the best resources in a teacher's professional development.

Microteaching greatly increases the opportunity for feedback. Since the emphasis is on practising a specific skill or achieving some other precise objective, the teacher, the supervisor, and the students have a clear picture of the purpose of the microlesson before it is presentd. As a result, the critique which follows is not aimed at the overall performance, but is rather on only one aspect of teaching behaviour. This approach is generally less threatening and results in more specific recommendations for improving teaching.

The several sources of feedback are designed to provide a teacher with maximum insight into his performance in the light of his goals. The teacher and the supervisor together review the student comments, as well as video or audio playbacks, and analyse the way in which the performance might be further improved. This feedback can then be immediately translated into practice by reteaching the lesson to a different group of students. The emphasis in microteaching is on helping a teacher to improve, *not* to judge his performance.

4. A TRAINING METHOD WHICH CAN BE VARIED IS SUPERIOR TO ONE THAT IS RIGID.

The most prevalent model for training beginning teachers takes the form of education courses supplemented by practice teaching in which they observe and work with highly competent "master teachers", with the exception that practice teaching will help the student's transition from acedemia to the "real world" of teaching.

This model has grave limitations. Its value for the trainee depends both upon the expertise of the master teacher and his relationship with the trainee. This supervisor simply may not allow much opportunity for the beginning teacher to practise, or may not provide him with adequate supervision. Even in the ideal relationship, however, there are drawbacks. For example, the master teacher cannot interrupt the classroom session to offer constructive suggestions, and there is no opportunity for the trainee to stop his presentation and repeat some portion that needs improvement. Also practice in the classroom must be integrated into the flow of the subject-matter; the skill or technique being practised must fit well with the content specified for that day.

Microteaching, on the other hand, allows for maximum control of the practice session. The length of the teaching, the number and kind of students, and the method of feedback can be varied according to the goals of the particular session. For example, the teacher, referred to earlier, who is interested in improving his skills in lecturing, can, after gaining comfort in presenting a 10-minute lecture to four or five students, gives a 20-minute lecture to 10 or 12 students, thus more closely approximating his teaching in the actual classroom. Unlike conventional practice teaching, microteaching provides an opportunity to practise the skills of lecturing until it is mastered, using videotape and written comments from the supervisor as a record of progress.

Since a number of variables can be easily manipulated in this constructed setting, microteaching is also an excellent research method. By manipulating a single variable, such as the nature of the supervision, countless hypotheses related to the improvement of teacher effectiveness can be investigated. Videotapes and the written feedback supply the researcher with recorded data from which he can work.

5. A GENUINE TEACHING EXPERIENCE IS SUPERIOR TO AN ARTIFICIAL ONE.

Peer teaching, role playing, and other simulated teaching experiences are being widely applied in teacher-training programmes. Although these methods do offer better opportunity for teachers to practise skills than the classroom, there has been a good deal of questioning about transfer of learning from these experiences to the actual teaching situation.

Fundamental to the microteaching concept is the fact that it is real. Although the setting is constructed, *bona fide* teaching of real students occurs.

INCORPORATING MICROTEACHING INTO THE PROGRAMME OF A SCHOOL FOR THE HEALTH PROFESSIONS.

Health personnel educators face the dual task of improving the instructional skills of existing faculties in schools for the health professions and of developing these skills in graduate students about to begin teaching. Perhaps one of the soundest and most economical routes for achieving both ends is to train the two groups simultaneously, using microteaching as the vehicle.

WHERE TO BEGIN.

Graduate students in both basic and clinical sciences frequently function as teachers under an experienced faculty member as part of their academic work, but rarely does any formal training in education accompany this experience. This situation provides an excellent opportunity to introduce microteaching as a method for assisting these students to acquire necessary instructional skills. Short-term programmes could be designed to increase their competence in conducting lectures, demonstrations, or group discussions. Since these programmes would not necessarily have to constitute a formal academic course, both established faculty and graduate students might be offered this opportunity. The faculty members could be asked to present a live or videotaped lecture or laboratroy demonstration to serve as a model for the graduate student introduction to these techniques, to function as supervisors in microteaching sessions, or to serve as consultants in designing training programmes.

DESIGNING AND IMPLEMENTING A MICROTEACHING TRAINING PROGRAMME.

One of the most important decisions in designing a microteaching programme is identification of the specific techniques or strategies to be practised by the participants. Since training in instructional skills which are not relevant to trainee needs is generally wasted effort, it is prudent to involve potential participants in the planning stage through interviews or questionnaires which can quickly isolate those instructional areas in which they feel some need for assistance.

A person expert in education is needed to assist participants in this identification, to provide the educational contents of the programme, and to oversee the operational details of the microteaching setting. For a

small programme with 15 to 20 trainees, one educator and three or four faculty supervisors, familiar with the content of the programme and trained in the microteaching process, is sufficient. If videotape recorders are used, an operator must be available to man the equipment. If the supervisor can be spared this task, it permits him more time to concentrate on the teacher's performance. If not, supervisors can be quickly trained to operate the equipment. For a larger training programme, staff should be increased accordingly.

Although several options are available for introducing this training activity to participating teachers, it will be most productive if at least one day before the microteaching programme begins participants read the material which describes the skill to be practised; take part in a discussion which leads to the formulation of those criteria that demonstrate effective use of the skill; view a live or videotaped presentation of the skill to which they can apply the criteria; design evaluation forms to be used by students and supervisors; plan a microlesson which incorporates the skill to be practised; and become familiar with such operational details as expected length of their lesson, the time of the reteach, and the kind of students to be taught.

Since microteaching is real teaching, students must be recruited who approximate, as nearly as possible to those that the teacher ordinarily encounters. If, for example, one is conducting a microteaching programme to improve the questioning skills of teachers responsible for a basic science programme in a medical school, then beginning medical students would be the most suitable choice.

Although the number in a microteaching session can range from one to 10 students, depending on the purpose of the lesson, four or five students is usual. In deciding upon the number it is well to keep in mind that microteaching is designed to assist teachers, not students. The setting, therefore, should be one in which teachers feel free to experiment without fear of failure. Unless a large number of students can be justified, the groups should be kept small so that concentration of the skill and maximum feedback can be achieved.

There is no prescribed length for the microlessons; they could vary from three to 30 minutes duration, depending upon the goals of the programme, the number of participants, and the time available. The most frequent length is five to 10 minutes, since this period generally offers adequate opportunity to practise a particular skill and to cover a significant amout of content.

Similarly, the length of the critique may vary. Ten minutes is generally adequate to allow feedback from students, supervisors, and videotape. With the format of a five minute teaching session and 10-minute critique, the two teachers can complete a teach-critique-reteach-critique cycle in an hour. For example:

9.00 - 9.05	teacher "A" - teach
9.05 - 9.15	critique
9.15 - 9.20	teacher "B" - teach
9.20 - 9.30	critique

9.30 - 9.35	teacher "A" - reteach
9.35 - 9.45	critique
9.45 - 9.50	teacher "B" - reteach
9.50 - 10.00	critique

Although the length of time between the teach and the reteach can be varied, if the reteach is given immediately after the first critique there is generally not sufficient time for the teacher to incorporate in reteaching the suggestions offered. On the other hand, reteaching a day or two later weakens the effect of the feedback received from the critique. An interval of 15 minutes to an hour between the teach and the reteach enables a teacher to plan a second lesson with the feedback suggestions freshly in mind.

Supervision is of critical importance to successful microteaching and merits the following consideration. First, as the focus of the critique increases, its effectiveness decreases. If more than two suggestions are offered for changing performance, a teacher often becomes confused, defensive or discouraged. Secondly, supervision should be supportive and lead the trainee toward self-diagnosis. This can best be achieved by allowing time for the subject to comment on his own performance. The supervisor can then assist by asking such questions as: "What did you think of the lesson?": "Do you feel that you met the goals you set out to accomplish?": "What will you do differently in your reteach?". If the teacher identifies his own problems, he is much more likely to seek out and reach solutions that will lead to improvement of that performance. Thirdly, if videotape replays are available, the supervisor should use this opportunity to reinforce effective behaviours, as well as to point out deficiencies. When ever appropriate the tape should be stopped, comments given and the segment replayed. Deferring comments until the end of the replay minimizes the reinforcement potential of the experience.

Finally, evaluation forms provide another valuable source of feedback. They can be used to record reactions from students, supervisors, peers, and the teacher himself. A sample form that a teacher might use in analysing his own performance is reproduced below. The questions could obviously be reworked into reaction forms appropriate to students and supervisors. The most appropriate evaluation forms, however, are those designed to respond to the specific objectives of the microlesson and the individuals responsible for evaluation.

SUMMARY.

Microteaching should not be viewed as a panacea for all the problems related to the training of teachers. While it may, for example, help a teacher to become more concious of his behaviour, it cannot transform a dull teacher into an intellectually exciting one. Its great advantage is that several valuable training functions occur simultaneously; it provides a setting which focuses on specific skills, enriches supervision, facilitates continuous training and research, and offers safe but realistic practice of instructional techniques. Above all, microteaching is a flexible teacher-training method and should not be abandoned if, for example, videotape equipment or experienced supervisors are unavailable. Since these and other variables can be adjusted, a precise definition of the microteaching context can vary according to the objectives desired and resources available.

* * * * * *

ORGANISATION OT THE PROGRAMME SKILLS

Any microteaching programme is designed to give the teacher the opportunity to observe, practice and evaluate their own performance of a specific teaching skill. The programmes do not always contain the same skills, nor the same organisation. This programme currently focuses on six major skills:

* Variability or stimulus variation.
* Reinforcement.
* Basic questioning
* Explaining and using examples.
* Set induction and closure
* High order (advanced) questioning

Each skill unit can be treated independently and should be completed before proceeding to the next skill. The skills are arranged in order ranging from relatively simple to more complex, and from relative teacher-centredness to more student-centred behaviour. The first three skills are somewhat interlocked, and are difficult to treat independently, but they all seem to be incorporated within the later skills.

MODEL

The programme is organised on the following sequence of events:

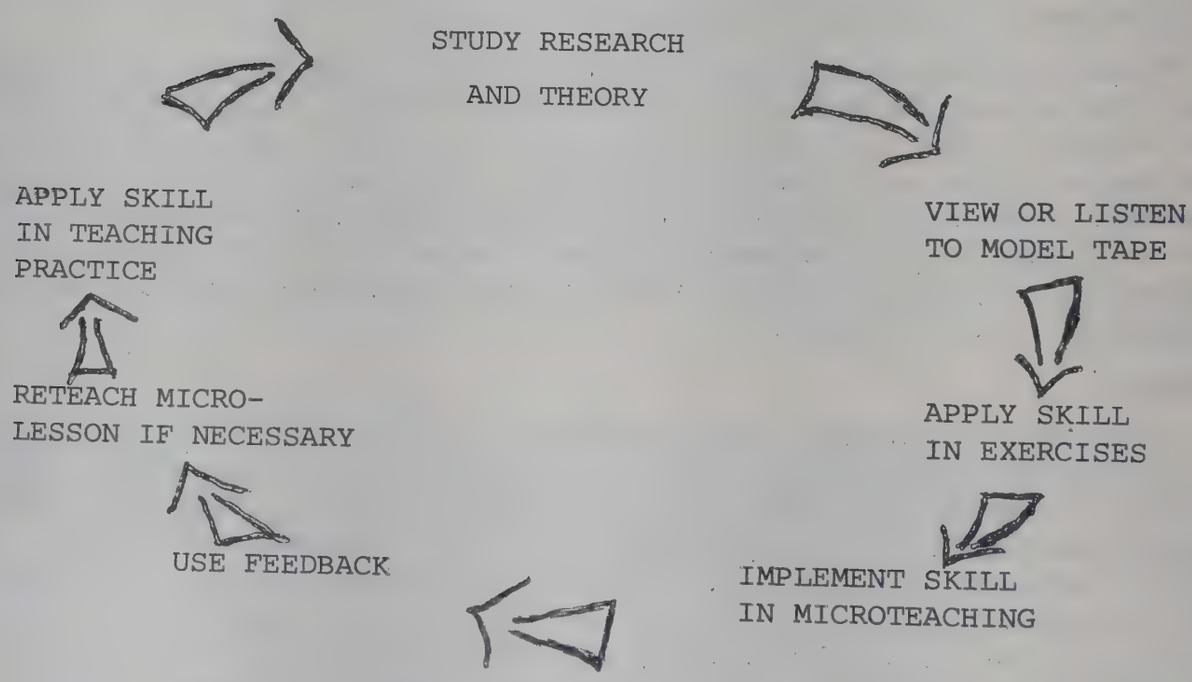

Fig. 1. MODEL OF MICROTEACHING PROCESS

(Adapted from Sydney Micro Skills Programme)

STEP ONE: STUDY RESEARCH AND THEORY

Having selected the skill, members of the group should read as much as possible about the skill and the rationale for its application.

STEP TWO: VIEW OR LISTEN TO MODEL TAPE

Select the tape to be modelled. The tape, whether audio or video, clearly demonstrates the application of the skill. The group should listen to this tape and discuss and review the tape. *TAKE CARE NOT TO ERASE OR DAMAGE THIS TAPE.*

STEP THREE: APPLY SKILL IN EXERCISES

There are activities or exercise set out to assist in the development of the skill, and these should be completed, either individually or in the group setting before you plan your micro lesson.

STEP FOUR: IMPLEMENT SKILL

In implementing your microlesson it is very important that you actually plan the use of the skill beforehand. Trying to demonstrate the skill without prior planning reduces the effectiveness of both the learning experience and feedback, both for the student teacher and the peer group.

Bring your own tape to the microlesson, so that you can record your own session and where necessary make a transcript, or use it for evaluation purposes.

Be careful not to exceed the stated time period for that microlesson. If you cannot demonstrate the skill in the given time period, poor planning and preparation are to blame - not the time period itself.

STEP FIVE: USE FEEDBACK

This programme utilises three sources of feedback:

* Self assessment using the tape
* Peer assessment
* Supervisor assessment

You will get feedback from all these sources based on the assessment guide for that specific skill. Only that skill will be assessed at that time, and not how well you give a lecture or run a discussion group, or even how well you know your topic.

STEP SIX: RETEACH

If you have done poorly on the skill, or feel you need more practice, then take time to replan and reteach the skill. Remember, the essence of this approach is to give adequate practice and to give each individual a chance to pace their own learning to a certain extent.

STEP SEVEN: APPLY SKILL

The next stage will be to employ all these skills together in any teaching - learning setting. Whether you are using a lecture, videoplay, or clinical supervision as a teaching method, all these skills will be needed to a greater or lesser extent.

IMPLEMENTATION

USING THE MANUAL

The workbook is specially designed for use during this course. Blank areas are designed to be used for exercises, notes and evaluations. It should be taken to each of the group meetings. Do additional reading if necessary.

WHAT DOES THE MICROTEACHING GROUP DO?

You will be one of a group of five and active membership of this group is an important component of learning and teaching. Each group member can act as a model, as a reinforcer and as a source of feedback. Each group has an individual tutor who is there to provide feedback on the practice of the skill, and to assist from his or her own experience in the improvement and use of the skill. Each group is expected to schedule its own time each week for the practice of the skill with the group tutor.

USING THE TAPES

There are model tapes which can be viewed by you or your group at any time. These tapes should not be removed from the learning lab and should not be erased under any circumstances. You will be given a blank cassette tape for use during this unit and the same cassette should be used for recording your skill demonstration. This tape you should keep with you and bring to each microlesson that you teach. If you want to use cassettes of your own, please be sure that they are sufficiently good, in condition. If you want to retain the tape, you must replace it with a new, unused tape of equivalent length and quality.

PACING

The group can select which skill it wants to study and can select how often and when to meet during the week. If the group feels that it needs more time to repeat a skill, then go ahead and plan your schedule that way.

GIVING FEEDBACK

For skill improvement it is vital that feedback from your fellow students is clear and critical, and equally your feedback to them should be clear and critical. Give sufficient time after each person has performed the skill to give comprehensive feedback. Read the evaluation format carefully before giving your colleague your verbal or written assessment, and be prepared to discuss or substantiate your points.

ASSESSMENT OF THE UNIT

The assessment of your performance will be based on whether you have achieved the objectives of the unit - that is, have reached an acceptable level of competence in each skill. This will be measured by;

1. the submission of this workbook completed, particularly the evaluation forms;
2. a supervisor's assessment;
3. submission of a model (demonstration) tape of a specified skill or skills, with a transcript of the tape.

HOW TO PLAN A TEACHING SESSION[1]

R.C. BANDARANAYAKE

How adequately do we as teachers plan our teaching sessions? Often planning is limited to noting a few major points which the teacher builds on as the lesson progresses. The more expert and experienced the teacher, the greater is his or her ability to carry out such an impromptu task. Unfortunately, however, the learner is often forgotten in the process. Assumptions are made that all students learn alike, are equally able to keep pace with the teacher, and that listening and note-taking are equivalent to learning. Learning is the most important reason fro the interaction between the teacher and the student. The teacher is responsible for planning adequately for student learning. This chapter describes one way in which a session could be planned, based on the three principles of learning.

1. Learning is facilitated when the students know *what* they are to learn and *why* they are learning it.
2. Learning is individual to the extent that students differ in their *rates* of learning, and in the *method* of learning that is most effective for them.
3. New learning is built on *previous learning*, and cannot occur in the absence of such previous learning.

A GUIDE FOR PLANNING A CLASS

In developing this plan it is assumed that the course has already been divided into a logical series of topics or units, and that each of these units represents a class in itself. To illustrate each step in the plan, a session in anatomy for a group of 25 second-year medical students on 'Movements of the eye' will be used.

1. State as precisely as possible what the student is expected to learn

Remember that students are not only required to 'know' certain facts or concepts, but also to 'understand' them, to 'apply' them to novel situations and to 'solve' problems using them. Students may also be required to learn to 'do' certain tasks, or to 'possess' certain attitudes or behaviours as a result of a learning experience. For example, the student should be able to:

1. name the movements of the eye
2. explain how each of these movements, and combination of movements, occurs
3. test for eye movement in a normal individual
4. determine how these movements are affected by damage to each of the cranial nerves supplying the muscles of the eye
5. identify the cranial nerve which is likely to be damaged in a patient with defective eye movement

2. Identify the purpose of learning what the student is expected to learn in the lesson

An important step which teachers often forget or postpone is pointing out to the students the reason for learning the material they are about to learn. Students learn best when they see purpose in what they learn for their personal growth or for future use. For example, the purpose of learning about the movements of the eye is to enable the doctor to detect damage to certain cranial nerves, which would be useful in localizing the site of a possible intracranial lesion.

3. Think of what prior learning is required if the students are to learn successfully what they are expected to

Plan for ways of ensuring that students possess this prerequisite learning. One way of doing this is by asking them questions pertaining to these prerequisites; another is by reviewing the content of, and their performance in, preceding courses. Sometimes these findings may indicate the need to commence the session at a more basic level than intended. Though this may interfere with the intended time schedule for the class, remember that ignoring such deficiencies would preclude successful learning. For example, to learn about movements of the eye the student should first understand:
1. the mechanics of muscle action
2. the axes of rotation of a sphere.

4. Design the sequence of learning within the session

Very often the sequence is determined by the increasing complexity of the material to be learned. For example, in learning the movements of the eye, such an hierarchical sequence of learning would be:
1. names of extraocular muscles and their attachments
2. the actions of individual muscles and of combinations of muscles
3. the testing of eye movement in a normal individual
4. the innervation of each muscle, and the effect(s) of damage to each nerve
5. determining which cranial nerve is most likely to be affected in a patient with defective eye movement

Learning can be sequenced in other ways, such as starting with a problem (for example, a patient with a cranial nerve lesion) and working backwards. These methods have been dealt with in other chapters.

5. Identify the method of instruction which can best achieve each of the steps in the sequence of learning

Some steps may require more than one method. Since individuals vary in the way they learn best, a variety of methods may be necessary to achieve a particular learning outcome. Variety of method has also been shown to increase student motivation. Logistic difficulties may result and often a compromise has to be made between the ideal and the feasible. The teacher would be wise not to be limited to methods such as lectures and demonstrations which encourage students to be passive recipients of instruction, but to involve students actively by discussion, practical exercise and assignments. For example, for the steps outlined in part 4 above, the following would be appropriate.

Step 1: Prior reading by students followed by the teacher explaining to the entire group using a model, and students in groups of five identifying the muscles on models and prosections.

Step 2: Explanation by the teacher to the entire group using a model, followed by students, in groups of five, practising on models and working out the movements on prosections.

Step 3: Demonstration by the teacher on one student from each group, followed by students practising on each other in groups.

Step 4: Description by the teacher of the innervation of eye muscles, followed by students working out effects of nerve damage in groups of five, with subsequent review in the large group.

Step 5: Each group of five students tests for eye movement in a patient with some defect, attempts to determine which cranial nerve is likely to be affected, and presents its findings to the rest of the class.

The audiovisual aids required for each step should be thought of at this stage, and action taken to see that they are ready for the class.

PLAN FOR ASSESSMENT OF STUDENT LEARNING INTERMITTENTLY DURING THE CLASS

Assessment of learning can be done informally by occasional random questioning followed by help when indicated. One strategy for informal assessment is to get students to help each other when in difficulty, with the teacher monitoring such activity. In an hierarchical sequence of learning, getting students to apply learning at basic levels to novel situations, is one way of checking whether learning has occurred.

For example, ask a student to examine a patient who has defective eye movement. This checks whether he or she has mastered prior learning concerning eye muscles, their action and innervation, as well as testing for eye movement in a normal individual.

Once planning for the session is completed the teacher should have a guide which, while not being too cumbersome to refer to in class, ensures that no part of what was planned is inadvertantly omitted.

1. from Cox and Ewan, The Medical Teacher, pp 57 - 60

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PLANNING LESSONS IN MICROTEACHING

You will have seen from the previous reading that lesson plans are *not* the same as teacher's lesson notes. If the teacher needs notes or books, then references to these can be included in the lesson plan. Try to start using these lesson plans from the start of the microteaching unit. Plan your microlesson, however short, based on the suggested or some similar format. Your lesson plans need not be exactly the same as Bandaranayake. It may be helpful to include a column for time, and the column on 'type of learning' has limited usefulness and can easily be omitted. Note that a lesson plan should not look like a script for a play or a radio programme. Igaga (1979) gives some excellent examples of planned lessons.

When planning a session for microteaching, bear in mind the interests and level of your students. Choose a topic of interest and develop relevant objectives. Having planned the session then it allows you to concentrate on the particular skill for that session. Remember in microteaching your colleagues are learning from you as you model a skill and are evaluating your performance on that skill. They are not interested in how much you know about viral hepatitis or contamination of water supplies !

*Igaga (1979) gives some excellent examples of planned lessons.

MICROTEACHING SKILL

(1) STIMULUS VARIATION

THE USE OF VARIABILITY IN THE CLASSROOM[1]

The teaching skill of variability is concerned with the changes or variations the teacher introduces in three main aspects of his teaching: (i) in his manner or personal teaching style; (ii) in the media and materials of instruction; and (iii) in the kinds of teacher-pupil interaction he introduces. As already pointed out, this idea of variation is closely bound up with variety since changes introduced in teaching inevitably lead to instruction characterized by variety. Variation is more the process. Variety is more the product.

The objectives of the teaching skill of variability are basically concerned with attention, motivation and learning, and may be summarized as follows:

1. To arouse and sustain pupil attention to relevant aspects of teaching and learning.
2. To provide opportunities for the functioning of curiosity motivation through the exploration and investigation of new situations.
3. To build positive attitudes towards teacher and school through the presentation of an animated and enthusiastic style of teaching and a rich classroom learning environment.
4. To cater for possible individual sensory preferences and so facilitate learning.
5. To promote learning by involving pupils in a variety of attractive and purposeful experiences at varied cognitive levels.

In this section the three main groups of components of the skill of variability are described and suggestions made for their practical application in the classroom. These suggestions are not meant to be exhaustive but rather seek to stimulate discussion and assist student teachers in thinking about the implementation of the skill both in microteaching and later in the classroom.

Before proceeding to a consideration of the skill components, several guiding principles regarding their employment must be made clear:

1. It is essential that *all variations be purposefully employed*. Variations in and between the components and their elements must be introduced to achieve worthwhile objectives; while moderate to high amounts of variations and variety are desirable, a bewildering array of variety and gimmickery with marginal relevance to the aims and content of teaching creates confusion and tends to detract from learning rather than promote it.
2. It is important that *variations be introduced with smoothness and continuity* so that the coherence and momentum of teaching are not hindered or destroyed and pupil attention and learning not distracted or hampered.
3. In line with the above principles, the use of many of the *components of variability will need to be carefully structured and pre-planned by the teacher*. However, there will also be a need to *employ the components flexibly and spontaneously according to feedback* received from pupils during the flow of teaching. Generally such feedback will be of two kinds: (i) behaviourial feedback concerning attention and involvement, and (ii) informational feedback concerning pupils' understanding and learning. Planning and introducing optimal levels of variation and variety are no easy tasks. Besides careful structuring of some applications of the skill it would be wise for the student teacher to generate alternatives before teaching commences so that when situations arise he may move freely from one strategy to another.

VARIATIONS IN THE TEACHER'S MANNER OR STYLE

Variation in the teacher's manner or personal style are infinite in their possibilities. These changes, carefully employed, can do much to attract and sustain attention, convey meaning , and in all, enhance communication and portray animation. Generally, variability of style and manner will occur in and between the following components: (i) *Voice variations*. These will include changes in the tone, pitch, volume, and speed of speech. A pleasant conversational talking style seems best for the teacher to adopt and this will naturally moderate vocal variations such as those mentioned. There will be occasions, however, when the teacher may need to be more deliberate in their employment. He may dramatize an event, emphasise points, relate quietly to an individual pupil, speak sharply to an inattentive child, and so on. (ii) *Focusing:* To focus attention on significant or key aspects the teacher may use 'verbal markers of importance', such as 'Watch closely', 'Now this is important', 'this is a difficult idea to grasp, so listen carefully'. Such verbal focusing is often accompanied by gestural focusing where the teacher points to an object or taps the blackboard for emphasis. (iii) *Pausing:* The insertation of spaces of silence in teacher talk and teaching activity is another attention demanding device. It captures attention by changing the stimulus from one of noise to quiet, or from one of activity to inactivity. It can be used to break teaching into easily processed units, marking the end of one teaching segment and preparing the pupils for the next. In questioning sequences the teacher's use of pauses or 'wait-time' after asking a question 'sets an atmosphere more conducive to productive questions on higher thinking levels. Students (pupils) use the wait-time to organize more complete answers'. (iv) *Eye contact:* When he is talking to or interacting with pupils, the teacher should shift his gaze around the classroom, meeting pupils' eyes with his, establishing a positive relationship and avoiding impersonality. He can use his eyes to help convey information. By fixing his gaze on inattentive pupils he may attract their attention. Also by shifting eye contact he can gain cues on pupil interest and understanding. (v) *Gesturing:* Variations in facial expression and head and body movements are important aspects of communication. These not only attract attention but help convey the meaning of the oral message. (vi) *Movement:* The movement of the teacher in the teaching space can help sustain attention. It can also help personalize his teaching. As the occasion demands he will need to move to the back and front, left and right sides of the classroom and among, behind and beside the pupils. Sometimes he will stand, at other times, sit. The important thing to reiterate is that these stylistic variations must be purposefully employed and not overdone. Teachers can overplay or underplay their roles. The wooden teacher is dull an uninteresting; the over-exuberant one is distracting.

VARIATION IN THE MEDIA AND MATERIALS OF INSTRUCTION

The media and materials of instruction may be arbitrarily categorized into three broad components on the basis of the predominant sensory mode of communication they employ; aural, visual, or tactile. Switching from the use of one of these components to another or from various kinds of materials within one component (e.g. from a picture to chalk board writing) necessitates a large number of sensory adjustments by pupils and makes for high levels of attention. It also makes for a multisensory appraoch to instruction which ensures that any preference pupils may have for learning through one sensory mode is adequately catered for. The novelty of materials can also capture the curiosity motivation of the pupils. Finally, and perhaps most important, a

rich and relevant variety of media and materials can stimulate thought and promote permanent and meaningful learning.

1. *Visual variations*

There are few teaching episodes in which pertinent visual variations, such as simple objects, chalkboard sketches, or pictures, cannot be used to advantage. On the broader front, bulletin-board displays, film and television viewing, library resources and field trips can also vary and enrich teaching.

2. *Aural variations*

In most classromms the teacher's voice is the main mode of communication. Variations in this mode have been previously discussed. In addition, this general aural mode needs abundant switching with visual and tactile modes. There are, of course, a number of other aural possibilities which can be usefully employed. The obvious one is pupil talk. Besides this there are recordings of sound and voice which have a multiplicity of uses. Recorded music and plays; the audiotaped roar of a blasting rocket, an interview with the local mayor, or even the 'voice' of a porpoise could all be gainfully introduced into relevant lessons.

3. *Tactile variations*

The final component of the skill of variability related to the use of media and materials is the teacher's provision of opportunities for the pupils to touch and manipulate objects and materials of instruction. These could perhaps even involve children in constructing or modelling activities. This component has been broadly termed tactile variation though it is usually associated with kinesthetic and visual variations as well. Such variations generally involve individual or small groups of pupils. Again, there are abundant opportunities to employ tactile variation in classrooms. For example, in primary-school mathematics pupils might explore a concept using Cuisenaire rods or in science they might conduct an experiment using levers. Secondary school history pupils might construct a medieval village or in geography, model landforms in clay from a topographical map.

INTERACTION VARIATION - CHANGES IN TEACHER-PUPIL INTERCHANGES AND PUPIL ACTIVITIES

The final major component of the skill of variability concerns changes introduced in the pattern and level of interaction. As mentioned in the review of research, changes in the general pattern of interaction may range from situations where pupils work independently of the teacher. Within this range, a number of other patterns are possible. The teacher might provide opportunities for the pupils, possibly working in small groups, to exchange ideas through exposition, discussion or demonstration without his intervention. The teacher might carry on discourse with the total class through questioning.

Within each of the general situations described above, many subsidiary forms of variation are possible. For example, Flanders (1970) has devised a system to analyse various kinds of verbal teacher-pupil interaction. He classifies teacher talk into seven categories: 'accepts feelings', 'praises and encourages', accepts or uses ideas of student', 'asks questions', 'lecturing', 'giving directions', and 'criticizing or justifying authority'. Pupil talk includes two categories, 'response' and 'initiation'. There can, of course, be finer variations in each of the categories suggested by Flanders. For example, the kind of questions asked in teacher-pupil interaction may be varied greatly. Bloom's *Taxonomy of Educational Objectives* (1956) sets out a

number of categories within which questions may be classified. Thus one teacher may vary the cognitive activity of the pupils by moving from knowledge questions to evaluation, analysis, synthesis, or application questions. Generally it seems that learning is facilitated by varying the cognitive level of classroom discourse. This is only one way of varying questioning. Questions may be divergent or convergent in the response they elicit. They may be asked of the whole class or directed at a specific individual. They can be used to attract attention, emphasize a point or begin a short discussion. The sequence and pacing of questions may also be varied.

The learning activities in which students may be engaged also can range widely. Besides listening to the teacher or participating in class discussion, pupils may contribute in small buzz-groups; they can work individually or in small groups on projects or tasks of various kinds; they can do written work, read silently or aloud, view a film, carry out laboratory work in science or language, engage in independent study, participate in games and simulations, engage in creative activities, and so on. The classroom configuration may be changed for particular learning activities. Instead of the traditional format of the teacher's table in front of rows of pupil's desks, for discussion a circular arrangement may be adopted. For a panel discussion or guest speaker there could be a semi-circular seating arrangement. For group work, desks may be clustered in different areas of the room. Independent study may be confined to sections of the classroom set aside for that purpose, or, particularly in secondary schools, at appropriate locations in the school library.

In changing the interaction patterns in his classroom, a teacher will inevitably change the learning activities of the pupils, the degree of teacher dominance and pupil involvement, the level of cognitive demand, and classroom configuration.

[1] from, Sydney Microskills. Series 1 Handbook. pp. 104-109.

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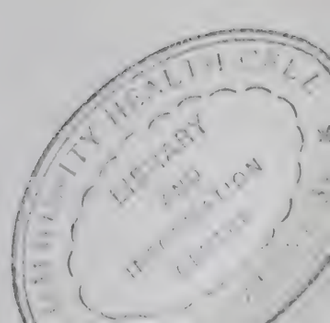

USING STIMULUS VARIATION SKILL

Changes in stimulation, not absolute levels of stimulation, heighten the arousal of the learning. There is now a great deal of physiological evidence that changes in stimulation produce arousal by affecting the reticular activating system of the brain stem. The changes in stimulation may be from low to high or high to low such as when the teacher stops talking. Changes in stimulation will gain and hold attention and it is during the time that you are holding the attention of the learner that he is most likely to learn from you.

The skills of stimulus variation is made up of several activities or behaviours of the teacher. They can be divided into six major components:

Movement	-	the teacher physically moves around
Gestures	-	the teacher uses hand, head and body movements to increase the dynamic aspect of teaching and to convey meaning
Focusing	-	calling attention to specific material
Pausing	-	pausing in verbal delivery
Shifting sensory focus	-	shifting from verbal to visual focus or vice versa or included tactile variations
Interaction variation	-	changes the pattern of interaction between self and students

When implementing this skill, do not expect to use each type of variation simultaneously with all the others. Too much activity on the part of the teacher can become distracting and overdramatic.

EXCERCISE 1. DISCUSSION

Discuss within the microteaching group how you think stimulus variation can help your own teaching? How do you think your students would respond? Are there any aspect you do not understand or consider irrelevant?

EXCERCISE 2. APPLICATION WITH A PEER GROUP

Select on of the following activities for a ten minute presentation to your peer group. Consciously incorporate as many variations as you can.
(a) Choose a story or legend that is not well known. Present it graphically to your group, with as much enthusiasm as you can manage
(b) Explain a single concept from your own training curriculum area that is not familiar to the majority of your group.

After each presentation the group members should make notes on variations that would have made the presentation more effective than it was. You will probably only have time for two or three presentations, but this will be enough for all of you to get a feeling of familiarity with the skill.

EXERCISE 3. LISTEN TO TAPE

Listen to the model tape. Note how the teacher is using stimulus variation.

EXERCISE 4. IMPLEMENT AND EVALUATE IN MICROTEACHING

Plan a short 'microlesson' trying to introduce as many aspects of variability as possible. The microlesson should be 5 - 10 minutes only. The evaluation form should be completed by you on the basis of the feedback you get from your peers and your supervisor.

EVALUATION OF STIMULUS VARIATION

	COMMENTS
At appropriate points the teacher moved about the teaching space	
You used gestures to convey extra meaning	
Teacher varied the rate of speaking and paused to give students time to think	
The important points were stressed by using non-verbal or verbal cues	
You shifted sensory focus from visual to auditory focus, or from one visual area to another visual area	
Introduced changes in pattern of interaction between self and students and varied activities of pupils	

MICROTEACHING SKILL

(2) REINFORCEMENT

THE USE OF REINFORCEMENT IN THE CLASSROOM[1]

In the section that follows, the skill of reinforcement is presented as a basic teaching skill for use by teachers in either primary or secondary school settings. It is proposed on the basis of the preceding theory and research evidence, that in applying the skill in the classroom there are a number of specific purposes or aims to be considered.

1. Reinforcement may be used to increase pupil attention.
2. The selective use of reinforcement may facilitate learning.
3. Motivation may be generated and maintained by using reinforcement.
4. Reinforcement may be applied to control or modify disruptive pupil behaviour and encourage productive classroom behaviour.
5. By gradually 'fading' extrinsic reinforcement and emphasizing self-reinforcement, pupil self-management of learning experience may be developed.
6. The use of reinforcement may also be directed towards the development of pupils in areas such as divergent thinking and independent initiative.

APPLICATION OF THE SKILL

A significant point to arise from the review of theory and research on the classroom use of reinforcement is that aspects of most components are basically applicableto all age groups of pupils. In line with the increasing age, sophistication, and maturity of pupils progressing through primary and secondary school however, it becomes unnecessary for some aspects to be used as much in the later years as with younger children.

It is also important that in using the skill components of reinforcement in the classroom the teacher must be sure that pupils are aware of, and fully appreciate, the desired behaviour upon which the reinforcement is to be contingent. Consultation with the pupils as to desired learning outcomes, behaviours, and performance standards, in addition to preferred reinforcers, will enhance this aspect of the procedure and may also prevent meaningless or inappropriate reinforcers being selected by the teacher.

As seen from the review of research studies, reinforcement in the classroom can be directed at responses in the following areas (this list is not intended to be exhaustive):

(i) attention to teacher, peers, and objects under discussion;
(ii) study behaviour, book work, reading and chalkboard work;
(iii) work output (completed pages, assignment sheets);
(iv) work quality (neatness, accuracy, aesthetic qualities, thought content);
(v) work improvement (in quality, output or appearance);
(vi) behaviour categories (task appropriate and inappropriate, verbal physical and written); and
(vii) independent work (development of self-directed and managed behaviour and self initiated work activity).

PATTERNS OF REINFORCEMENT

Various patterns of reinforcement have been developed by researchers and can be applied in the classroom The basic division of reinforceemnt patterns is into continuous or intermittent reinforcement. Continuous reinforcement refers to the reinforcement of 100 per cent of the desired behaviours of a given class. The continuous reinforcement approach is recommended in the early learning of new material but is rarely practically possible in the normal classroom situation. Intermittent reinforcement refers to the reinforcement of some responses but not all. Intermittent reinforcement may be either predictable or unpredictable. Where it is predictable, the reinforcement given either after a fixed number of desired responses (fixed ratio) or after a fixed time the first appropriate response is reinforced (fixed interval). In the unpredictable pattern the interval or ratio is randomly assigned so that no predictable pattern of reinforcement application is apparent.

Reinforcement which is intermittent and unpredictable leads to 'steady working or persistent behaviour' rather than pupils only working or attending when reinforcement is likely to occur and expected, as in the predictable situation. A further point of importance is that intermittent reinforcement 'gives behaviour greater resistance to extinction than does continuous' (Vernon, 1972. p.85). The practilities of implementing reinforcement in classrooms limit the use of continuous reinforcement and research indicates that an intemittent reinforcement pattern is more effective with longer lasting effects.

In selecting an appropriate pattern of reinforcement for implementation in the classroom, the teacher needs to keep in mind the individual pupils and their predispositions as well as whole class groups considerations. The selection of different reinforcement frequencies and patterns (or 'schedules', the more common term from the literature) related to individual needs, interests, behaviours and abilities is a significant principle of the operant approach.

COMPONENTS OF THE SKILL

At the outset it should be emphasised that while all components are feasible and desirable for use by the teacher in either primary school classes or secondary school groups, variations in pupil acceptance and appropriateness of certain components for different age groups need to be considered.

Six components are identified and described as well as being illustrated in use in classroom situations in the audiovisual programme.

1. *Verbal reinforcement*

The teacher's comments of praise and encouragement when used to reinforce pupil responses or behaviours are referred to as verbal reinforcement. Comments of a personal, evaluative and supportive nature, as well as performance and feedback or knowledge of results aspects, are included in this component

2. *Gestural reinforcement*

Closely linked with verbal reinforcement is the component of gestural reinforcement which refers to the teacher's use of smiles nods, or pointing, as non-verbal responses to pupils' contributions to a lesson, performance, or behaviour. Often, teachers can develop particularly significant gestures

that become identifiable as personal and idiosyncratic reinforcements which may lead to improved informal teacher-pupil interaction as an added benefit.

3. *Activity reinforcement*

This term is used to cover the basic idea of the Premack Principle whereby access to a high probability (or desired) behaviour or activity, is made contingent upon a lower probability behaviour. Activity reinforcement occurs in the classroom when the teacher uses an activity or task that pupils prefer or enjoy, as a reinforcer for previous classwork or performance. In this chapter it is suggested that activities that still clearly contribute to the general lesson aims should be preferred by the teachers as reinforcement, rather than unrelated activities or games. This latter point may well vary considerably in applicability according to pupil needs and interests.

4. *Proximity reinforcement*

Teacher attention to, display of interest in, and physical nearness to pupils, when linked to pupil performance, can be described as proximity reinforcement, Madsen and Madsen, (1970). Often teacher proximity serves as a 'cue effect' for associated verbal, personalized, token, or contact reinforcement, since these are administered usually by a teacher in close physical proximity to the 'target' pupil.

5. *Contact reinforcement*

Closely related to proximity reinforcement, contact reinforcement is the term applied to a teacher's use of physical contact such as a pat on the shoulder, shaking hands, ruffling hair, or other physical teacher-pupil contacts (Madsen and Madsen, 1970) in such a way as to reinforce pupil behaviour, performance, or efforts.

6. *Token reinforcement*

In this chapter, token reinforcement is a term used to apply to the teacher's use of any symbolic reinforcer contingent upon a pupil's desired performance or behaviour. Included are such tokens as teacher ticks, stars, points, written comments, cards, or even plastic chips. Some controversy does arise around the issue of whether token reinforcement must always be supported by 'backup' reinforcers (toys, gifts, prizes, food) for which accumulated tokens may be exchanged. O'Leary and Drabman (1971) point out that 'backups' are necessary if a token programme is to work in its pure sense. They do acknowledge that backups (and even the token reinforcement) should be gradually withdrawn in favour of 'natural' (social) reinforcers. Altman and Linton raise what appears to be the significant point for the present discussion by concluding:

> For some, and perhaps most children, doing well in school signified by stars, grades, and points is already a desirable consequence when they enter school. For others they may become incentives by being exchanged for other reinforcers such as access to responsible positions, earlier dismissal from school, and teacher or parental approval, (p.281)

MODES OF USAGE

The six components of the skill of reinforcement as outlined above may be applied in what have been identified as four modes of usage.

1. *Whole group reinforcement*

Reinforcement may be applied by the teacher to the whole class group from

time to time as well as to individuals within the class. Usually such an application would make use of the verbal, gestural, token, and perhaps activity components rather than all six. Lipe and Jung (1971) review a few studies which have demonstrated effective results using whole group reinforcement.

2. *Delayed reinforcement*

Reinforcement using any component in whatever pattern, should be as immediate in following the response as possible. Delayed reinforcement is said to be less effective than immediate but delayed reinforcement may be used it the delay can be 'bridged' by explanation, or verbal cues, to emphasize that it is delayed, but forthcoming. In general, the cliche 'better late than never' is applicable but, too late is little better than not at all.

3. *Partial reinforcement*

The term 'partial' reinforcement, in the literature on operant procedures, usually refers to intermittent, or non-continuous, reinforcement. However, in this chapter, and in the audio-visual programme, the term partial reinforcement has been used to apply to the reinforcement of partially acceptable responses by pupils. This concept is similar to what Allen and Ryan (1969) term 'positively qualified reinforcement'. The use of partial reinforcement is closely related to the principle of avoiding negative reinforcement and criticism, while emphasizing the positive approach.

4. *Personalized reinforcement*

The use of specific pupil ability and performance references, and directing reinforcement components at an individual pupil (by using his name for instance), may be a more effective treatment than merely anonymous and non-specific reinforcement.

PRINCIPLES OF USAGE

Underpinning the application of the components of the skill of reinforcement are four general principles.

1. *Warmth and enthusiasm*

Rosenshine (1970) discusses the aspects of teacher warmth and enthusiasm in relation to pupil behaviour and achievement. While there are definitional problems surrounding enthusiasm and warmth sub-components, it is fairly well documented that these components do play a part in teacher-pupil interaction and are correlated with effective use of reinforcement components.

2. *Avoidance of negative reinforcement*

Although some research has shown that negative reinforcement in the form of criticism or punishment is effective in changing motivation, performance and behaviour, it is proposed in this chapter, as effectively summarized by Lipe and Jung (1971) that:

> Punishment is a complex and rather controversial area of phychological study. Most proponents of precision teaching methods advocated the use of positive rather than negative incentives due to the more predictable effects of positive reinforcement (p.260).

Accordingly, the avoidance of strong negative reinforcement such as derogatory remarks, strong negative gestures, or ridicule and criticism is emphasized as a basic principle in the application of the reinforcement skill in the classroom. This does not mean, however, that feedback on

incorrect or inappropriate responses is to be totally ignored. What is proposed is *positive* reinforcement contingent upon pupils' correct, or appropriate performance.

3. *Variety of usage*

The use of a variety of components, in a flexible and varied manner, by an enthusiastic and warm teacher, is the goal of this skill development programme. Rosenshine (1971) has detailed the importance of variations in different aspects of teaching, as has Chapter 4 of this book. Such variation principles apply particularly to the skill component usage of reinforcement. Repetition of the same style or type of reinforcement such as continual use of 'That's right' or 'Oh, how nice!' or the frequent use of one rubber stamp imprint as the only class reinforcer, will lead to a loss in the effectiveness of that particular reinforcer. It is also useful to vary reinforcement between the whole class group and other sub-groups or individuals during a lesson.

4. *Meaningfulness to pupils*

For any reinforcement to be effective it must be administered in a situation where the pupils have an understanding of the contingent relationship of the reinforcement to their behaviour and it should always be in a form that they see as meaningful. Often verbal praise may be ineffective because it is inappropriate for the child concerned, or it may be misdirected and be aimed at the wrong child, such as where the teacher praises a child's efforts in art by saying, 'You are ***such*** a good artist, Bill!' when the child, Bill, may in reality be a very poor artist and he is well aware of his shortcomings. He might interpret such praise as being insincere and inappropriate rather than reinforcing. Telling a slow learner with a history of failure and a poor self-image that he is 'brilliant!' or a 'very *clever* boy' may at times also be met with little enthusiasm and pride. Pupil age, social groups, context of reinforcement application, and sex of pupils and teacher, appear to be relevant to this principle. A good ground rule for meaningful reinforcement is to observe and even consult the pupils as to what they see as reinforcing.

[1] from Sydney Micro Skills. Series 1 Handbook. pp.24-30.

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USING THE SKILL OF REINFORCEMENT

Positive reinforcement of a behaviour increases the likelihood that the behaviour will recur. If a student behaves in a desirable way, immediate positive reinforcement **increases** the probability of his continuing to do so. Besides directly increasing learning, reinforcement is an effective means of increasing student participation in the classroom. And participation, in its turn increases learning. When students become involved with the material they pay closer attention than when they do not take part. An experiment conducted at Standard University has shown that teachers who often reinforce their students for joining in class discussions draw more participation from their students than teachers who reinforce infrequently.

In summary, reinforcement can be used to:

(a) increase attention
(b) facilitate learning through selective use
(c) generate and maintain motivation
(d) control or modify disruptive behaviour
(e) encourage student self directed learning by emphasizing self reinforcement
(f) develop skills in divergent thinking and independence

The difficulty is that the strength and the quality of any reinforcer varies with the student to whom it is applied. No teacher can know exactly what will positively reinforce each of the students in each of her classes. Through observation a teacher can notice that certain reinforcers might be more effective than others.

Following are several suggested reinforcers available to any teacher:

(a) Positive verbal reinforcement - words such as 'good', 'right'
(b) Positive nonverbal reinforcement - verbal cues such as mm, nonverbal nod
(c) Positive qualified reinforcement - enforces the right part of the behaviour only
(d) Delayed reinforcement - enforces later during classtime or after class

EXERCISE 1. GAME

Four members of the group are given, on a sheet of paper, a problem to discuss. The remainder of the group act as observers, and note how each of the four uses each other's contribution. Everybody speaks in turn. If a participant cannot make a contribution he passes on his turn to the next participant. Passing Scores - 1; Positive use of contribution. Score + 1; Only acknowledging previous contribution. Scores 0. Speaking out of turn or ignoring other's contributions knocks a player out of the game.

The game should last about 5 minutes. Any topic may be used, but it is best to use a value-laden question. The score at the end shows who is best at using other's contributions.

EXERCISE 2. ROLE PLAY

With your group members prepare a role play on some current issue. Assign roles and then during the discussion have each member positively reinforce any contributions that support their own position. Contributions that contradict their own position should be negatively reinforced. Allow 10 - 15 minutes. Once the role play is finished, discuss your response to positive and negative reinforcements. Did you find it easy to give either

positive or negative reinforcement? What effects of reinforcement could be seen in the group?

EXERCISE 3. LISTEN TO TAPE

Listen to the model tape and note the ways the teacher is reinforcing.

EXERCISE 4. IMPLEMENTING AND EVALUATING THE SKILL

Plan a microlesson of 5 - 10 minutes, that reinforces student contributions, attention to the task in hand and the completion of work. If necessary, discuss with your supervisor the suitability of the material you are planning to use.

On completion of the microlesson evaluate your effectiveness at reinforcement using the evaluation format

USAGE	COMMENTS
1. Teacher showed warmth and enthusiasm for the topic, students and interactions	
2. Reinforcement was either immediate or delayed, but was positive and was occurring and negative reinforcement was avoided	
3. The reinforcement was varied in kind	
4. The reinforcement was appropriate to these students' level and interests.	

MICROTEACHING SKILL

(3) BASIC QUESTIONING

SKILL COMPONENTS IN QUESTIONING [1]

Analysis of research studies into teaching, including videotapes of teachers in action, leads to the definition of some skill components which are important in the ongoing process of asking questions. (Turney *et al.*, 1975). These skill components are outlined below.

1. *Distributing questions.*

For quite sound reasons, most teachers direct a question to the whole group, expecting that all will engage with the issue, and will be mentally framing an answer. Often one person in the group will volunteer, or someone may be nominated to attempt an answer. During any lengthy interaction, experienced teachers try to spread questions around, in order to involve as many as possible in the discussion.

2. *Redirecting a question*

When a thought-provoking or genuinely open question has been asked, generally there will be several different ways in which it can be answered. A teacher does well to get mileage out of good questions, by inviting others to respond. Such an invitation can be made by merely naming someone else to attempt a further answer, or by silently indicating with a look or hand that another is to take up the point.

3. *Prompting techniques*

Prompting is among the strategies used when a demanding question evokes little or no response from students. Techniques are to rephrase (putting the question at the same level but in different words), to review (going back over points made so far), and to put a simpler question (breaking down ideas or concepts involved to a less demanding level) (Turney *et al.*, 1975).

4. *Structuring*

Very often, before moving on to a new section, the teacher foreshadows where the lesson is going, or what will happen next, or why a particular issue is being examined. This is called *structuring*. Obviously it can occur in conjunction with questioning, when the teacher may clarify aims or establish a context before proceeding to question. While the notion may be somewhat vague, good teachers, like good speech-makers, constantly undertake structuring moves.

UNDESIRABLE HABITS IN QUESTIONING

Before turning away from the 'how' of questioning, let me note some habits which are best avoided.

1. Repeating one's own questions *verbatim* can become for students an annoying distraction. If, after a reasonable wait, there is no attempt at an answer, then prompting techniques can be employed.

2. Repeating student' answers *verbatim*, unless for a concious purpose, achieves little. However, there is evidence to suggest that a teacher's rephrasing of some point in an answer can be useful, serving to highlight a key issue, an essential concept, a clue to a new direction for the discussion.

3. Answering one's own questions can be counter-productive; students come to anticipate it, so are reluctant to attempt answers. If regularly

[1] from: Cox, K & Ewan, C. *The Medical Teacher*. pp. 27 - 29.

practised, self-answering clearly devalues the whole process of asking questions in order to engage students in worthwhile grappling with new material on the basis of what they already know. Such a struggle can lead to learning on the students' part, which is after all the whole point of teaching. In the teaching/learning game, it is at once foolish and unfair for the teacher to make all the moves (Turney *et al.*, 1975).

TYPES OF QUESTIONS

In the same way as the how of questioning can be broken down into component parts, the what of questions can be analyzed, with a view to improving the skills of practising teachers. Some of these components are still related to the ongoing process of teacher questioning during a session with a group, while others are bound up with the intent and content of the questions themselves.

At the simplest level, any question posed ought to be as clear and brief as possible. Usually each question will have a single *focus*, though some students may be able to handle more than one direction simultaneously. I suspect that for most of us, grappling with one demand at a time is quite enough. The focus of a question may be narrow (that is, encouraging convergent thinking, leading to one acceptable answer), or it may be broad (that is, encouraging divergent thinking, allowing of many acceptable answers). From the research studies (Gall, 1970; Tinsley, 1973), it would appear that questions of the former kind are overused. Questions of the latter kind are most useful for beginning a discussion with young adults.

At a more complex level, in asking a question the teacher usually intends to set the students thinking. At least that is what we would claim, though studies of teachers at work indicate that most of the time questions are asked to gauge straight *recall* of what has been said or read. There are certainly occasions when such questions may be asked, but we can go beyond memory and rote knowledge to *comprehension* (understanding of a concept expressed in one's own words) and to *application* (putting an idea to work in a particular situation). At a yet more demanding level, we can ask questions which invite *analysis* (the separation of complex ideas into constituent parts) or *synthesis* (the formulation of unique extended responses, one's own putting together of a complex answer). *Evaluation* questions are extremely difficult to frame and to field, because they involve students in making explicit judgements on the basis of clear criteria (Bloom, 1956; Sanders, 1966). Even more problematic are questions about *feelings*, because students are invited to verbalize publicly their own values, convictions and prejudices (Turney *et al.*, 1975). My hunch is that in all kinds of teaching, including medical, we have avoided many of these more demanding types, for they are just too hard, too difficult to frame, too threatening to consider, and too uncomfortable to cope with as students field them. But they will not go away, and the rewards for the teachers who risk them are great, for themselves as well as their students.

Only some of the possibilities have been outlined, and I am not suggesting that boundaries between the categories of question type are particularly clear-cut. Any one difficult question can lead to thinking patterns which merge and overlap. But the value for the teacher lies in being aware of varying demands our questions can make, and in then planning points at which more complex questions can be put in a teaching session.

KEY QUESTIONS

In interaction situations, the *sequence* of questions is crucial, so teachers need to spend time working out in advance those key questions which will get students' minds into gear, raise crucial issues, and lead learners to master, where feasible; new ideas on the basis of what is known. When a question proves too tough, teachers can drop back to a lower thought level, but need continually to extend students by raising the level of thinking required at every opportunity (Turney *et al.*, 1975).

In our analysis of videotaped lessons by experienced teachers, we discovered that the more successful questioners would have only a small number of key questions, each carefully worded and rather demanding, which they would then keep open for a period during discussion. As already suggested they often, by using name or gesture, invited students to keep on answering. Alternatively, when somebody attempted to grapple with a question, they would draw out that student, or others in the group, by seeking to have more added to the response given. We called this aspect of questioning *probing*. Teachers probed for clarification (Just what do you mean by ...?), for support (Have you some evidence for ...?), for accuracy (Can you show the truth of ...?), for relevance (How does that bear on ...?), for examples (What particular case shows ...?) and for complexity (isn't there more to it? Is it just a case of ...?) (Turnet *et al.*, 1975).

Again, my aim is not to suggest sharp categorization, but rather to have teachers aware that worthwhile questions may be utilized and followed up in various ways, in order that students might build on their tentative first attempts. What we have called probing is yet another way to keep a demanding question open, thereby encouraging students to work from where they are towards the unknown and less familiar.

Those who get sustained value from their questioning are people who have learnt to be patient, who, having put a well-worded, thought-provoking question, just ... wait! (Turney *et al.*, 1975). *Pausing* seems to be virtually a skill in its own right (you might note the way skilful interviewers employ this technique in video or television). Clearly, if a demanding question has been asked, students need time to come to grips with it, to make up an answer in their minds, rather than to risk putting often vague, unsure ideas into words. Teachers seem almost pathologically afraid of silence; yet waiting even a short time encourages students to think, to respond, and to keep on answering.

* * * * * *

BASIC QUESTIONING

PROMPTING, PROBING, DISTRIBUTION AND REDIRECTION

In order to be able to develop maximum participation on the part of the students it is important that the teacher is able to stimulate the flow of responses from students and use the responses that come from the students. Asking questions of students should not merely be a routine exercise to waken students but should challenge the student to think and participate in the class

PROMPTING AND PROBING

This can be developed by the use of prompting and probing questions. Prompts are used by the teacher to elicit a response from a student, a probing question uses the response that the student has given and develops it further. By probing, the teacher requires the student to go beyond, or amplify his initial response. Because a probing question relies entirely on a students' response it is not possible to prepare probing questions, but you can develop your ability to use probes when the occasion arises.

PROMPTS are when the teacher gives the student a hint to help him answer the question.

e.g. Teacher : What is the square root of 94?
Pupil : I dont know
Teacher : Well, what is the square root of 100?
Pupil : Ten
Teacher : And the square root of 81?
Pupil : Nine
Teacher : Then what do we know about the square root of 94?
Pupil : It's between nine and ten

PROBES are of three main types: clarifying, increasing students' critical awareness, and refocusing the response.

e.g. Teacher : What exactly do you mean? (Clarifying)

e.g. Teacher : What are your reasons for thinking that is so?
Is that all there is to it? (increasing critical awareness)

e.g. Teacher : Can you relate this to .....?
What are the implications of that? (refocusing)

Prompts and probes can be used interchangeably, and there is no implication that one is better than the other. They fulfill different functions, and you should be able to use them as and when the situation demands.

REDIRECTION

This is used when the teacher wants to continue with one question but gets responses from different students. It is easily done, such as by naming students, or indicating which student is to answer. Its use can increase the degree of student participation.

DISTRIBUTION

Some pupils are more willing to answer questions in class than others. These pupils are often brighter and more attractive. They usually know the answers that the teacher is seeking. The teacher finds such pupils rewarding and he may, therefore, unwittingly devote more time to these pupils than to their less forthcoming peers. In this way the teacher unintentionally produces a cleavage in the class between a small group of active participants and a large group of passive learners. Their passivity may change to boredom, then to deviant behaviour and discipline problems for the teacher. These problems can be minimised by directing questions to specific pupils and distributing the questions around the class. There is no easy solution to the problem of asking non-volunteers to answer questions, as the research evidence is conflicting. The teacher has to recognise that distribution of questions around the whole group is what should be aimed for.

FOCUSING

Questions can be either broadly focused or narrowly focused, and are appropriate at different times. The important aspect is that teachers should be aware of how they should be used and recognise when they should be used. Questions with multiple focus should be avoided.

CLARITY AND BREVITY

A final aspect of questions is that they should be clearly understandable.

PAUSING

Teachers need to give time for students to respond. A surprising number of them fail to do so!

* * * * * * *

EXERCISE 1. OBSERVATION

Using the Askit: Analysis of questions format, observe any teacher in a classroom setting as to the kind of questions being used in that classroom. Note whether questions are broad/narrow, recall/thought level, confused or clearly expressed, and the tone in which the question is expressed. Is there a common pattern in the way teachers develop their questions? Compare the different patterns observed by different members of the group.

EXERCISE 2. APPLICATION WITH PEER GROUP

Conduct a series of interviews with individual members of the group on topics about which the individual people have special knowledge. Design questions which will enable the interviewee to give responses requiring only a minimal degree of prompting by the interviewer. Ask other members of the group to comment on the clarity, brevity and focus of the questions you ask.

EXERCISE 3. RADIO/TELEVISION INTERVIEWS

Select an interview situation such as on the radio or television. Analyse the questions asked by the interviewer. Are the questions clear and focused? Does the interviewer need to use prompts and probes, and if so, try to decide why they were necessary.

ASKIT : ANALYSIS OF QUESTIONS

QUESTION	NARROW	BROAD	RECALL	THOUGHT	CONFUSED	CLEAR	THREATENING	NEUTRAL	ENCOURAGING	ANY COMMENT

1. Note question briefly 2. Put a tick in appropriate columns

Use L for lecturer's question
S for student's question

General comment on questions asked

EXERCISE 4. MODEL TAPE

Listen to the model tape and analyse it using the evaluation format.

EXERCISE 5. IMPLEMENTATION AND EVALUATION OF SKILL

Prepare a 5 - 8 minute lesson on a specific topic. Select a topic that requires a lot of verbal interaction. Plan about five key questions to ask during the lesson. At the end of the lesson, evaluate your performance according to the evaluation format.

EVALUATION OF BASIC QUESTIONING SKILL

	Comments
Was the phrasing clear and brief?	
Was there a single focus to each question?	
Could the teacher redirect the question effectively?	
Were the questions well distributed within the group?	
Did the teacher pause to allow students to respond?	
Could the teacher use prompts when necessary?	

MICROTEACHING SKILL

(4) EXPLAINING AND USE OF EXAMPLES

UNDERSTANDING EXPLANATIONS

AND THE PROCESS OF EXPLAINING[1]

The word 'explain' covers a host of human activities, but essentially involves an attempt to give understanding to another (Thyne, 1966). Usually explanations are designed to answer the question 'Why?' But the question 'How?' and 'What?' can also be answered by offering explanations. So the question 'What symptoms and signs would be suggestive of malignant change in a mole?' invites an *interpretive* explanation, setting out the characteristics of malignant melanoma. The question 'How is an ECG interpreted?' requires a *descriptive* explanation, outlining steps in the process of ECG reading. The question 'Why is blood pressure elevated in chronic renal disease?' demands a *reason-giving* explanation, showing the mechanism of renal hypertension.

Such a classification of explanations into these three categories is oversimplified, but it is essential for the medical teacher to sort out just what kind of explanation is being attempted. Ask yourself. What question(s) am I trying to answer in this lecture, demonstration, or seminar?

PRESENTING EXPLANATIONS

The ideas presented come from research studies, and from analysis of videotapes where teachers have given explanations. The first two components relate to language, while the remainder are concerned with presentation.

CLARITY AND FLUENCY

These characteristics of verbal interaction are particularly important in explaining. Clarity covers the choice of vocabulary appropriate to an audience. Fluency concerns the smooth flow of language, with acceptable sentence structure and use of appropriate linking words, such as 'although', 'if ... .. then', 'as a consequence'. These are aspects of clarity and fluency which have been identified as important to learning in studies of explaining (Barnes *et al.*, 1971).

Defining new terms

Defining new terms is a crucial skill related to clarity. Unfamiliar subject matter needs to be introduced in words which are true to the discipline, but which can also be comprehended by most of the target group. Defining 'claudication' for a group of first year students as 'pain due to inadequate blood supply' would be helpful, but as 'a symptom of vascular insufficiency resulting from accumalation of metabolites' would be decidedly unhelpful! In explanations, some precision is called for, with a spelling out of connections between parts. Excessive qualification ('the systolic bruit of mitral regurgitation is usually loud, usually high-pitched and blowing, but may be harsh and medium-pitched, and loudness is not a reliable indication of its severity') is obviously unhelpful for students, especially when they are grappling with unfamiliar material.

The use of explicit language

Explicit vocabulary and grammer relates to both clarity and fluency.
A characteristic of good explainers which has emerged in a number of studies is that of *avoiding vagueness*. Often vagueness results from loose sentence structure and continual hesitations: "The, um, blood pressure is er, a function of cardiac output and its also related to ... we get ah, a combination of the two and ah, um, that results in the level of blood pressure..."

Each of the above characteristics depends to some extent on natural skill in using language. But mastery of subject matter and careful preparation will assist any teacher to become more fluent and clear, with attention to defining new terms carefully, attempting to use explicit language, and avoiding vagueness as far as possible.

EMPHASIS

A medical teacher can highlight key ideas, important examples, main links, and significant relationships in many ways during the course of an explanation. Some general means include varying *gestures* and facial expression, and selecting aids or *materials* or overhead transparencies. Progressive *summaries* or a handout, can draw attention to the major points which have been made (Turney *et al.*, 1975). However, in the process of actually explaining, verbal means of emphasizing will be paramount.

Voice emphasis

The use of voice, varying the pitch, tone, volume or colour will draw attention to certain points. It has also been suggested that the deliberate *use of pauses* occasionally, either just before, or just after, a statement draws attention to an important idea (Brown, 1978). Once again, three quite specific verbal activities have been isolated in our reviews and analyses as useful in the process of explaining .

Repetition of main points

Especially in a final or progressive summary, repetition serves to emphasize what the explainer thinks ought to be specially noted. 'So far then we have seen the value of dietary carbohydrate restriction and weight loss as preliminary steps in the management of mature onset diabetes mellitus.'

Paraphrasing

Paraphrasing ideas contributed from the group is another means of emphasizing what is important (Dunkin & Biddle, 1974). This rather sophisticated procedure involves accepting and acknowledging contributions, at the same time incorporating them into the explanation framework in the required technical terminology: 'So when Mary says that we should determine whether the lump is mobile, she is seeing the need to check out whether it is attached to underlying muscle tissue by infiltration.'

Verbal cueing

Stressing essential points to be attnded to by means of markers such as 'The main idea ...' 'Now carefully note this...' 'Two significant causes ...' is known as verbal cueing.

Once again, some lecturers and teachers will use gestures, voice and pauses quite naturally in an effective manner while explaining. But any person charged with explaining tasks can plan for repetition of main points throughout an explanation, can attempt to use ideas from the group by paraphrasing them when necessary, and can utilize verbal cueing, if only to draw attention to what needs to be learnt!

USING EXAMPLES

Concrete examples

Much organized learning, whether in third grade Primary natural science lessons or in third year University anatomy classes, is a presentation by means of words, which are often abstract in nature and formal in content.

At a general level, numerous studies show that senior high school and tertiary students have difficulty sustaining generalized or hypothetical thought. It would appear that we all benefit from the introduction of *appropriate and concrete* examples, both to relieve a high level of sustained thinking, and to support and test generalizations and hypotheses which are presented in the course of any explanation. Thus the statement 'Any lesion of the extrapyramidal system causes involuntary movements and alteration of muscle tone' needs several examples to clarify just what is intended. Perhaps a film of a patient with Parkinson's disease would help.

Positive and negative examples

The research studies suggest two specific points concerning the use of examples. Examples do appear to be needed in *sufficient quantity* to support the generalizations being considered. Explanations rated as effective usually contain a higher number of examples. In turn, these can be both *positive and negative*, to help clarify concepts

From studies of thinking, it would appear that positive examples need to come first, being most readily understood, while negative instances should come later, being harder to handle but serving to sharpen understanding. So congestive cardiac failure includes the following symptoms, dyspnea, basal crepitations, raised jugular venous pressure with hepatomegaly and ankle oedema, but excludes clubbing of the fingers

Relevant examples

Examples chosen should be *relevant to the group's experience*. Perhaps a negative instance will make the point. Talking about the physiology of nerve conduction is hardly likely to turn community nursing aides on!

And examples need not come just from the teacher. While the person explaining needs to be ready to provide support for generalizations presented, it is surely motivating for group members, as well as being a measure of their level of understanding, when they can provide appropriate examples of the concepts being considered from their own background or existing knowledge.

ORGANIZATION

Generally business-like behaviour in teachers at secondary and tertiary level is approved of, especially by peers and science students. Organization in the process of explaining can be examined at several levels . At the most general and obvious level, an explaining episode benefits from **having** a clear beginning (tell them what you will explain!), providing orientation to the topic, a clear development (tell them what you are explaining!) setting out the necessary logical steps required for understanding, and a clear ending, (tell them what you have explained!) summarizing, reviewing, and providing closure.

At another level, clear structure of any sub-section - a longer explanation is commonly a connected series of smaller explanations - can be achieved. Often an attempt to answer a 'How?' or 'What?' question involves a chain of generalizations, loosely or tightly linked, with supporting examples. For instance, taking our earlier example of malignant melanoma, symptoms such as itching and bleeding lead the doctor to look for associated signs of malignant change such as areas of hyperpigmentation or lymph node enlargement. But the answer to a 'Why!' question can lead to either a *deductive* or an *inductive* pattern. In the former, a generalization is presented first, with supporting examples to follow, then a restatement of

the principle hypothesis, or law. (In shorthand, this pattern is summarized as a rule — example — rule.) Thus, 'Bile salt emulsification of fat is necessary for fat absorption.'

Example 1. Common bile duct obstruction prevents bile entering the gut and the bowel motions become fatty.

Example 2. Similarly, fat-soluble vitamins such as vitamin K are not absorbed through the gut wall.

In the latter a number of examples are presentd leading to the statement of a generalization which can be abstracted from the particular. (This in summary form is example — example — rule.)

Example 1. Increasing the number of cigarettes smoked each day increases the prospective rise of lung cancer.

Example 2. The risk of lung cancer increases with the years of cigarette smoking.

Example 3. The risk of lung cancer increases if the smoke is inhaled, and if the cigarette is smoked down to the butt.

Example 4. The risk of lung cancer falls when cigarette smoking ceases.

Therefore, we can induce a dose-response curve on concomitant variation of the cause of cigarette smoking.

The research is equivocal about which pattern is the most effective. My hunch is that either pattern can be effective, depending on the kind of explanation being given, and the medical teacher's aims. The deductive mode suits an occasion where the explainer wants to introduce a different concept, provide an example or two, then see if the group can contribute appropriate instances supporting the introduced generalization. On the other hand, the inductive mode lends itself to an occasion where the teacher wants group members to arrive at a conclusion which is based on the specifics presented. A lecture on autoimmune aspects of disease might be best suited to a deductive pattern, while the elucidation of a clinical picture during a bedside tutorial lends itself to an inductively organized explanation.

FEEDBACK

The concept of feedback, whereby continuous monitoring leads to modification in an ongoing process, applies as well to explaining as it does to electrical circuitry or pituitary control of endocrine secretion (Dunkin & Biddle, 1974). Some of the means by which a medical teacher may gain feedback in the course of an explanation have already been mentioned. Examples may be contributed by group members. Conclusions may be drawn by the group in an inductively organized pattern. Such means provide some assessment of how well the explanation is being understood. Othe obvious means for gaining such information include *asking questions* directly to the group, to monitor their grasp of essentials, or providing some kind of structural review towards the end to test their knowledge of a topic (Turney *et al.*, 1975). Less obvious ways displayed by teachers whose explanations have been analysed include providing opportunities where *group members can ask questions*, not just at the end but at points throughout the explanation, or seeking some *display of attitudes, feelings or value positions* relevant to, or arising from, an issue under consideration. Thus the topic of cloning could raise many questions about the theoretical possibilites of the process, as well as some expressions of concern about the moral dilemmas it poses.

Fig 2 Key considerations in planning explanations

PRESENTATION COMPONENTS	PLANNING FACTORS				
	KIND OF EXPLANATION	*KEY CONCEPTS*	*MAIN LINKS*	*LAWS OR PRINCIPLES*	*ADAPTATION TO GROUP*
	Clarity and Fluency	What new terms need defining		Are these stated in precise, unambiguous terms?	
	Emphasis	What means will stress the import of main ideas?	How can major relationships be highlighted?		
	Using Examples	What examples can best illustrate concepts		How many examples are necessary for understanding?	Can they provide examples? Are examples within their knowledge or experience?
	Organization Can main question be broken down into What? How? Why?			Particular pattern appropriate-rule-example-rule or example-example-rule?	Which pattern best aids understanding?
	Feedback At what points can understanding be best assessed?	How can prior knowledge be assessed?	In what ways can group show their grasp of links?	Can group state generalizations in their own words?	What allowances have been made for group characteristics?

and main links by means of a diagram, setting out for yourself in concrete form the parts and their interrelations.

So two further important steps in planning involve specifying key concepts and the main links between them.

Yet another step in planning involves determining whether there are any hypotheses, principles, laws or rules involved. For example the last 'Why?' question above involved the principle of negative feedback on pituitary secretion, as well as the principle of autonomous thyroid secretion in primary hyperthyroidism, and these must be understood in order to grasp the whole explanation.

All these steps are tied up with the nature of explanations. The final and rather crucial part of planning requires that the explanation be adapted to the target group. Their poor knowledged and experience will be important considerations, as will be your assessment of their ability to sustain high order thinking. Also critical will be the choice of examples which illustrate key concepts and major generalizations. The figure 'Planning Factors' suggests on a grid, made up by the inter-section of presentation components and planning factors, questions any teacher might consider when preparing an explanation. It could be especially useful when planning for a new or diffficult topic, or one with which you have had little success in the past!

In this brief consideration of planning, much has been left unsaid about the nature of explanations. The interpretive, descriptive and reason-giving labels are over-simplified, and teachers in specialist areas of medicine need to take account of aspects of their disciplines which depart from the categories outlined (Hyman, 1974.).

Nonetheless, this summary of the outcomes of research studies and the analyses of teaching tapes has been presented in order to help the medical teacher improve the business of explaining, which is central to education in medicine. Whether you teach in a small group setting, or lecture in large theatres full of students, the suggestions made can help you become a more efficient explainer. Put these ideas to the test by trying out several which appeal to you in your next explanation. Try using the set of questions in the figure when you have difficult concepts to explain.

[1] In Cox & Ewan *The Medical Teacher*. Churchill Livingstone. 1982. pp 33 - 37.

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EXPLAINING

USE OF EXAMPLES

When a teacher is explaining a difficult idea to a group of students he is likely to be asked for examples and illustrations. An abstract idea is easier to understand when it is related to a concrete illustration. If the teacher cannot provide the illustration, the students may be unable to comprehend the idea, and they may wonder if the teacher himself understands it.

The following are guidelines for effective use of examples:

1. *Start with the simplest examples*
A basic principle of concept formation is that examples given to illustrate a concept confront the learner with a complex sorting task. If you begin with complex examples the students may become confused by excess information and miss the point.

2. *Use examples within the range of students knowledge and experience*
If they are not then they are useless as examples.

3. *Do not assume that the more examples you give the better the understanding.*
Unless examples illustrate the new aspects of the concept, they will add nothing to the students' understanding.

4. *Relate the examples to the idea*
Do not assume that students will automatically connect the examples given with an idea. Relate the examples to the idea yourself or have the students do it.

5. *Get students to give you additional examples*
If their examples are good, they have probably grasped the concept.

CLARITY OF LANGUAGE

Explanations will not work if the students cannot understand the language. Explaining should be clearly expressed and specific, not vague.

ORGANIZATION

The logic of the explanation should be made explicit, and the main points summarized either progressively or at the end.

EMPHASIS

Emphasis, by using the voice, repetition or paraphrasing helps to focus the students attention on the critical aspects of the explanation.

EXERCISE 1. 'SNOWBALL'

Divide into pairs. One person should then explain a topic in which he or she is interested for two minutes. The listener may ask questions but not take notes. Then form pairs. The first listener in each pair gives a summary of the explanation heard. The second pair of listeners should then give their summaries. The group of pairs should discuss the errors, ommissions and misunderstandings and try to arrive at what counted as a good explanation and a good summary.

EXERCISE 2 RADIO/TV

Listen to a ten minute segment of a lecture or talk given on the radio or television. Analyse it for specific aspects of explaining.

—— Count instances of vague words.
—— Note changes in voice used for emphasis.
—— Note instances of repetition used for emphasis.

Decide whether you thought the explanation was clear or not.

EXERCISE 3 MODEL TAPE

Listen to the model tape and evaluate the explanations given against the evaluation format. What were the shortcomings of the model tape? Decide which examples could have been improved and whether the explanations were clear and understandable.

EXERCISE 4 IMPLEMENTATION AND EVALUATION OF SKILL

Plan a 5 - 8 minute lesson that contains an explanation. Evaluate your performance against the evaluation format.

	Comments
Was the language specific, precise and relevant.	
Appropriate and relevant examples were used.	
Examples were concrete and within the students experience.	
Main points were emphasised.	
The explanation was in a logical order and main points were summarized.	

MICROTEACHING SKILLS

(5) SET INDUCTION AND CLOSURE

THE USE OF INTRODUCTORY PROCEDURES AND CLOSURE IN THE CLASSROOM[1]

In this section the ways of introducing and closing teaching - learning episodes are presented as components and suggestions made for their practical application in primary and secondary classrooms. But first the aims and principles for employing the skills need to be established. The main objectives of employing Introductory Procedures and Closure are as follows:

1. To induce in pupils a state of readiness appropriate for the immediate task, through gaining their attention and arousing internal motives.

2. To indicate to pupils realistic limits for the task in hand, keeping them within those limits where necessary.

3. To suggest approaches pupils might take to the subject matter to be dealt with.

4. To indicate links between various aspects of the topic under consideration.

5. To establish links between what pupils know or have already experienced, and what is introduced as new or unfamiliar.

6. To consolidate for the pupils important facts, skills and/or concepts covered in the episode.

7. To assess the impact and effectiveness of a lesson, particularly in relation to pupil learning.

As with other teaching skills, there are certain principles which underlie applications of the components of Introductory Procedures and Closure to be considered by teachers. Foremost among the principles are:

1. *Meaningfulness* In gaining attention or enlisting motives the teacher needs to select ways and means which are meaningful to the pupils, yet at the same time clearly related to the content of the teaching episode and its objectives. Gimmickery is to be avoided, for unconnected novelty may secure short-term attending from pupils but fail to establish an appropriate set enduring for the task.

2. *Sequencing and continuity* The activities undertaken by the teacher introducing or rounding off a segment need to be part of a coherent whole. The establishment of an appropriate set, the enlistment of relevant interests, and above all, the continuous and natural linking of one part of the episode with another, or with pupil's experience, or with previous knowledge, can assist this sequencing and continuity.

The components of Introductory Procedures and Closure fall into several groups of related aspects and activities. As the skills are integrative, to use Allen's term (1968), there will be some overlap between the components. Examples are given to illustrate classroom applications of the aspects under discussion.

GAINING ATTENTION AND AROUSING MOTIVATION

The ways in which a teacher can gain attention are only limited by his time and imagination. The *teacher's manner* will provide a way of getting pupils to attend if he sometimes departs from his usual approach. Thus he may choose an unusual position in the room for the lesson's opening, or perhaps adopt a special tone of voice. Standing or sitting with the class, or at

the back, then reading a poem either very quietly or more dramatically, would gain attention if used sparingly from fourth class on. Introductory stories or anecdotes told with expression and conviction will attract pupils of any age.

Aids can certainly be attention getting, serving also a number of useful purposes related to other components of this skill. A striking or novel aid provides the kind of focal stimulus which ensures that all pupils are attending. For all age levels, an invitation to look closely at a picture or poster possibly covered at first then revealed, or to listen to a tape or some song relevant to today's session remains common yet successful ways of gaining attention by visual or audio means. Tactile aids are less commonly employed, yet they have an appeal and unique use which persists well into secondary school. Rods, or multi-base blocks in mathematics, provide visual and tactile representation of abstract ideas. Even for senior students, the factors of quadratic equations demonstrated concretely will get attention. The use of aids which are real objects in themselves (artifacts, signs, animals) are certain to involve pupils. Where these are not available, a film or videotape can provide the vicarious experience which will put pupils right into a setting (e.g. films of baboons and their social organization, or videotapes of Shakespeare or of science experiments which can never be reproduced in the classroom). Slides or film strips are not as immediately involving but have other advantages, such as being open to longer study. Finally, primary sources (contemporary newspapers, photos, drawings, cartoons) appear to have a much greater impact than secondary sources (textbooks, reviews, opinions)

Variation in the usual pattern of teacher-pupil *interaction* can provide a stimulating beginning, though in fact probably depend for success on the teacher knowing his group well. Usually also, preliminary structuring remarks from the teacher will be necessary. Use of differing patterns of grouping within the class occasionally can gain attention and heighten expectancy. Buz-groups where pupils talk freely in two's or three's about one aspect of a topic for a few minutes get all pupils involved and establish the possibility of divergent contributions later. One pattern which seems to work well with large groups of junior secondary pupils is to present some initial stimulus with attention holding features along with a short explicit instruction about pupils responding quickly in rough note form to *one* aspect of the topic. With everyone having an initial response ready, there is a basis for discussion when any pupil in the group can be expected to contribute. Another variation which demands organization on the teacher's part is to have available a number of displays (models are particularly useful) where pupils move around, singly or in groups, looking for certain features.

It seems clear that any initial stimulation if depending on novelty for effect, will gain attention for a limited span. Having gained attention and established a set by external means the teacher will want to move on quickly to arousing motives, thereby enlisting those internal factors which facilitate learning.

Teachers may attempt to engage directly *social motives*, particularly in infants classes, creating a context within which pupils (and the teacher) can co-operate on a task. Operating a shop, behaviour conventions in certain situations, learning traffic rules, in fact any kind of play provides opportunities for recognition and social acceptance to functions, so enhancing learning. Once teachers know their classes, they will be aware of opportunities appropriate to their group to engage social motivation.

Curiosity and *surprise* can be powerful sources of motivation. Ambiguous stories or sets of pictures will engage most children, particularly if the teacher invites questions, or sets pupils on a quest for alternative solutions Suchman's technique, a variation on the game of twenty questions answered by yes or no, where pupils seek to explain a scientific phenomenon - why a heated steel ball will not pass through a steel ring - could have applications in many subject areas from third grade on, and engage the curiosity of a group, though class size might mean certain modifications.

Conceptual conflict arising from consideration of a problem or perplexity can be highly motivating. If there are specifiable factors governing the location of cities, why have cities not appeared in locations satisfying those conditions? Is the state of man really as bad as Golding depicts it in *Lord of the Flies*? Bafflement can engage pupils for long periods in dealing with a series of apparently irreconcilable demands. What could be done if a plane crashed in the desert, with only a little water, some people injured and in need of care, location unknown, no radio, and those with expertise in navigation dead? Contradiction seems to demand the ability to deal with numerous alternatives, as in the following two examples. Plants by definition contain chlorophyll, but fungi contain none, yet are still classified as plants

Interests of children provide a vast store of relevant activities for Introductory Procedures. Those which will be especially applicable are largely determined by the group itself, factors such as age and sex being important, along with the location of the school, for often interests are governed by geography and socio-economic factors. Knowledge of pupils and their individual pursuits will provide endless opportunities for relating interests with lesson concerns, as well as indicating useful leads into certain topics or areas. For infants and primary classes, play has already been mentioned and young children's interest in stories provides a great range of potential beginnings. The desire for activity, for making things and finding out how things work can also be utilized. For instance, making a local area model, or a working model of a shaduf obviously engages pupils' energy and intrinsic motives more effectively than just talk. Television provides points of contact with pupil interests, and subject matter for discussion up till the age of 14 or so. With secondary pupils, analysis of the media, or of the use of language in advertising, are relevant, and can sustain effort for long periods. A role play (e.g. taking the part of a dying man's family) can reveal the complexities of value questions in an unique way. Buzz groups about the pollution problems directly affecting pupils where they live can lead to discussion of wider issues and principles. References to sport may also provide discussion starters for wider issues such as competitiveness **versus** co operation, or team versus individual sports.

It has been apparent as the discussion has developed that there is need for the teacher to move from employing external factors towards greater reliance on intrinsic motivating factors. The objectives of any Introductory Procedures are for the teacher, mindful of his class, to select carefully what will appropriately gain his pupil's attention then enlist those motives and interests which facilitate learning.

The examples that have been given indicate ways whereby attention and internal motivating factors may be aroused and enlisted. If attention and motives have been engaged, a state of readiness exists. This will be evidenced by external signs of pupil interest, by eagerness to get on with the task, by the pupils' accepting attitude towards what will follow in the lesson.

Other signs would include the animation and quality of the responses, the questions they might ask, and the quickness with which they react to the teacher's suggestions.

STRUCTURING AND MAKING LINKS

The treatment of structuring has been somewhat different from that of the other components, for a series of narrow alternatives have been described rather specifically. Comments may be designed to state *limits* for the immediate task, a primary teacher saying, 'Today we are going to talk about these three pictures, and afterwards, write a story which really might have happened.' Or, following several lessons on newspapers, the secondary teacher may begin, 'We have still not found out much about advertising. Now I want you to go through these papers and measure the column inches given to ads., then we'll work out how much space they occupy and what that means.'

At the beginning, or at appropriate points during a presentation, the teacher may advise pupils about *ways of proceeding*. 'Here are some 1856 newspaper accounts of gold diggings. Listen and look carefully. Dont try to remember everything, but put yourself in the position of a policeman trying to give reasons to the miners for paying licences'. Usually teachers ask for the positive attributes of a concept to be found such as listing the the characteristics of a person or thing or comparing pictures or landscapes. But sometimes the negative qualities, what is missing, can be just as useful. 'In reading this passage, see if you can find out why the Club excluded Mr Jones from membership'. Or, 'Examine these rocks and decide why some are igneous while others are not'.

A series of *questions* can be structuring. For instance, before showing a film on the life cycle of the mosquito, the teacher quizzes pupils closely to see what they know about metamorphosis. Less specific questions for example, where a teacher provides a number about the connections between events or the place of characters in a short story before a second reading, certainly aid understanding and indicate to pupils what aspects are to be focused upon.

Brief *advance organizers*, or the presentation and revision of known materials before presenting something new find many applications in the classroom. Thus with a primary class the teacher may check over subtraction before introducing division for the first time. A review of iron-making processes can provide a useful lead-in to a first treatment of steel-making. A summary of a lesson or unit may provide an opportunity to indicate what is coming shortly in another topic. Key organising concepts can be emphasised, such as occurs when treating New Guinea gardeners before looking at neolithic man, to bring out the dependence of such communities on co-operation between members of the group.

Opportunities for making *links with the familiar* will arise continually. One example is when a teacher in dealing with intersecting sets in maths, refers to properties of sets which pupils already know. Another is when a geography teacher goes on to talk about the Pacific volcanic ring having already dealt with other important chains. Constantly comparing and contrasting is a further way of linking new knowledge to what is already known. Aspects within the actual episode may also be linked. Any time a teacher draws on a pupil's contribution to a lesson, he not only reinforces that effort, but also makes a cognitive link

Comments aimed at *keeping within the limits* set out at the beginning can

make a distinct contribution to a lesson. A common example when tangents pursued get too far away from the original topic is where the teacher brings discussion back to the central theme. Some limits may be set more consciously for a certain effect. When discussion biased statements about migrants, for example, the teacher might accept all initial contributions from those who agree with any of them, insisting on listening to no disagreements initially, in order to challenge later certain assumptions, as well as ensure the involvement of those who wanted to voice dissent from the start.

REVIEWING AND EVALUATING

Reitieration of key points is generally an ongoing process during a lesson. It can occur at many appropriate moments such as after looking at the first few stanzas of a poem, when the teacher summarized orally what has been discussed to date. After a series of questions, or an interchange on part of a topic, a pupil can be invited to sum up the outcome. As well as providing a useful variation, writing down the main points covered already in the lesson revises and consolidates for each individual. Such reviewing has been characterized as making links back into what has gone before. In almost any subject any of these strategies for reviewing would indicate clearly what was already understood, and where the gaps were in pupil's knowledge.

Summarizing as well as taking this oral form, often is very effective in a written form. The teacher may build up a summary on the chalkboard as the lesson proceeds. Alternatively, the teacher may have pupils make up a board summary, or present the findings of each group for the class to consider. Teacher and pupils can co-operate in summarizing activities. For instance, in a lesson on landscapes, after looking at pictures in pairs, the pupils may contribute characteristics of savannah grasslands while the teacher writes them up on an overhead projector. It is common for the teacher to arrange for pupils to provide the information, his task being to *elicit a summary* by drawing out what they have learned.

Evaluation can take many forms, and goes on at points throughout a lesson as well as towards the end. When pupils come to the board and work through a new mathematical operation, or when pupils read out their own poetry or illustrate their own stories, they are *demonstrating skills*. Having discussed features of climate and rainfall in a tundra region, pupils who can recognise from graphs stations in another tundra region are using acquired concepts, *applying new ideas* to another situation. Testing the aid originally used to start a lesson against newly acquired concepts may perform several evaluative functions. The teacher might ask a maths class to demonstrate quadratics using multibase blocks, introduced at the beginning. A model presented in economics can be tested for points where it breaks down when subject to real situations. Pupils may be directly invited to comment on the effectiveness of an activity. For instance with role playing, this is an essential step when pupils may learn a great deal from their own *expressions of opinion* about how they felt during the sociodrama. More traditional forms of evaluation suitable for some lessons, such as a summary with key blanks for pupils to fill in, either together on the board, or individually on a duplicated sheet, are effective and should be utilized where appropriate.

1½ from Sydney Microskills Handbook Series 2, pp 92 - 99

* * * * *

SET AND CLOSURE

Set and closure are perhaps two of the most important stages in lesson presentation. Without adequate 'set' to the lesson, students attention is not aroused, and without closure there is no consolidation of learning.

Set induction should be done at the beginning of a lesson, when changing topics, before a question and answer session or discussion, or before using a tape or film. Set induction has several functions which are of two main types; social and cognitive. At the social level, set achieves the stimulation of student interest and involvement. At the cognitive level, set creates a frame of reference, gives meaning to a new concept of principle, and will focus student attention on what is to be learned.

EXAMPLES OF SIMPLE SET INDUCTION DEVICES

a) Do something unusual at the beginning of a lesson. If it is too unusual it might disrupt learning.

b) Show students an object and ask them questions about it.

c) Ask a provocative question such as 'Would you deliberately refuse to treat a patient who is drunk?' to introduce a discussion on ethics.

EXAMPLES OF SIMPLE CLOSURE DEVICES

a) 'Now let us stop and go over what we have learnt about metabolism.'

b) Get the students to summarise the major points or concepts.

c) Get the class to practice the skill that has been learnt.

EXERCISE 1 OBSERVING

Observe one or two teacher's lessons. What components of set induction and closure were used by these teachers? Which of the techniques seemed to be most effective?

EXERCISE 2 RADIO/TV

Listen carefully to a current affairs programme or a debate, noting the key concepts presented. Then prepare a 5 minute summary, emphasising, reviewing and evaluating the programme.

EXERCISE 3 MODEL TAPE

Listen to the model tape, identifying the components of the skill. How would you improve upon the set and closure?

EXERCISE 4 IMPLEMENTING AND EVALUATING THE SKILL

Plan a ten-minute lesson on a topic unfamiliar to your group. Try to relate your introduction to the interests of the group and establish an appropriate set. Review and evaluate the lesson as part of the closure. Then evaluate your own performance against the evaluation format.

EVALUATION OF SET INDUCTION AND CLOSURE

	COMMENTS
Did you gain the attention of all your students?	
Did you arouse their motivation?	
Did you set clear enough limits for the session?	
Did you review by repeating or summarising?	
Did you manage to evaluate whether you achieved the lesson objectives?	

MICROTEACHING SKILLS

(6) ADVANCED QUESTIONING

THE USE OF ADVANCED QUESTIONING IN THE CLASSROOM [1]

The preceding review of research documents how recent educational writing has re-emphasised the call for teachers to involve pupils in more thinking, in this case through the questions a teacher asks in classroom discussion and activities. Yet, the findings of recent research concerning the low level of thinking required to answer the vast majority of teacher's questions are parallel to those of Stevens of 1912. It would appear to be far from easy to learn the effective use of higher level questions. The development of sophistication in the use of such questions requires careful thought and extensive opportunity for practice.

In describing the components of the skill of advanced questioning, we are attempting to build on and further elaborate basic questioning practices described in the *Series 1 Handbook*. The statement of objectives for basic questioning is therefore directly relevant to advanced questioning, but as well, the following objectives are of particular significance:

> To assist pupils to develop abilities in acquiring, organizing, using and evaluating information.
>
> To increase pupil abilities in forming and articulating reasoned statements which take account of the available information.
>
> To encourage pupils to reflectively develop ideas, and statements of those ideas, in a reciprocal relationship with other members of the group.
>
> To provide opportunities for *all* the members of a group with which the teacher is working to experience success in going beyond the immediately obvious to implicit or new ideas.

While many factors will affect the reaching of these objectives, we are confident that the thoughtful use of the following components of the skill of advanced questioning, will be one important factor.

VARYING THE LEVEL

It is commonly assumed that the questions a teacher asks have different effects on the kinds of thinking pupils engage in to meaningfully answer them, and that some kinds of thinking are more complex and difficult than others. In searching for a way to classify types of questions and specific objectives for pupils' thinking in relation to these questions, we have used the well-known work of Bloom *et al*. We have, however, departed somewhat both from the original concept and terminology used by Bloom and his colleagues. In the description of types of questions that a teacher may employ, we are proposing a useful system of classification which is of assistance to teachers in designing learning experiences and in determining whether their questions range over a variety of cognitive levels. Bloom suggested that he had formed a *taxonomy* in which each class subsumed the operations of the preceding class. This claim is not made in relation to our classification system, and in the accompanying videotaped materials it may be observed that teachers' questions range widely, though not randomly, across the various classes suggested. In fact, it seems that Bloom and his colleagues themselves may have doubted the strictly taxonomic nature of their classification (e.g. 1956, p.144).

Nevertheless, despite these reservations, we are confident that familiarity with the six categories discussed below is potentially a very useful tool

for teachers, and that skill in using the various types of questions is helpful in achieving the objectives established. Necessarily what is presented here is a brief treatment of each of the categories. For a more detailed, elaborate treatment a reading of Bloom's original work is strongly recommended.

Recall

Recall questions ask pupils to remember information they have previously learned. Though recall questions frequently relate to knowledge of specific facts, they are not limited to this level and may involve pupils in remembering the broad concepts and generalizations previously discussed, definitions, methods of approaching a problem and criteria for evaluation. *Provided that pupils had previous knowledge on which they could draw*, the following would all be examples of recall questions:

> What sound does this word begin with?
> What is an smpty set?
> Who wrote *Josh*? What are some other books that this author has written?
> What happens when the government increases the statutory reserve deposit?
> What should we use to measure this distance?
> How can we find the rate of inflation on these products for the past twelve months?

It is likely that early in a lesson the teacher will ask quite a large number of recall questions, as he gives pupils an opportunity to form a basis of information on which to move to more complex questions. Often, the pace of the lesson will be quite fast at this point and the teacher will frequently use the techniques of prompting outlined in the *Series 1 Handbook*.

Comprehension

This category of questions is very widely used and is *not* limited to the familiar reading comprehensive questions asked after the presentation of a prose passage to pupils. Comprehension questions involve the ability to translate a communication, to interpret its meaning and to extrapolate consequences or trends suggested in a communication.

The translation of a communication can involve the simple expression of an idea in different words, but it might also involve the development of an accurate summary, the re-writing in verbal form of a statement made in symbolic form or the giving of a specific example to illustrate a very abstract idea. Interpretation involves the pupil in distinguishing the broad major elemnets in a piece of writing, and in re-ordering and re-structuring these elements to make them mor accessible to himself or somebody else. Extrapolation involves the pupil in going beyond what is specifically given to determine the implications of the view exposed.

Thus, though comprehension questions are sometimes regarded as demanding only a relatively simple level of thinking, they can in fact involve a pupil in quite difficult tasks. The teacher will need to exercise considerable care to match realistic amounts of time for responding to the degree of complexity a comprehension question involves.

Some examples of comprehension questions might be:

> What number sentence would represent this arithmetical problem?
> How might this memo appear if it were written in everyday English rather than jargon?
>
> If you believed, as these people did, that gods lived in every tree, how would you react to the clearing of the forest? Why would you do this?

From your reading of this sheet of music, what would you say about the rythm of the song?

What are the main points to emerge from this statement? Are they all relevant to the writer's assertion?

Given that the writer we have been considering believes that all men are inherently good, what would you expect him to believe about the effect of society on the individual person?

Application

Application questions require the student to use abstractions and generalizations in particular situations. In their original work Bloom *et al.*, noted that this category is very close to that of comprehension, but they distinguished application questions as ones in which the pupil needed to use a general idea voluntarily, rather than in circumstances where the use of the idea is already prescribed. In a mathematics lesson, for example, a teacher might say 'If two sets with the same numbers of elements are equivalent sets, what is an example of two equivalent sets?' In this case the pupils are given the definition and only have to provide a specific illustrative example. Application might be involved when pupils are asked to list as many statements as possible about the characteristics of two sets. In the latter situation, there is a requirement for the student to see the applicability of a general idea, as well as, of course, to understand what the general idea is.

Though the student's voluntary use of general concepts is a very important objective of good teaching, it does seem unnecessary for the purposes of classroom questioning to attempt to make too rigid a distinction between the categories. A broader definition such as the above is easier to use, and includes both types of application.

Of crucial importance is the need for pupils to have numerous opportunities to apply knowledge they have previously gained in a variety of situations, both voluntarily and in more constrained circumstances. The teacher's use of the latter strategy is likely to be more frequent during the early stages of the acquisition of an idea, and the former strategy when pupils have gained more confidence in its use,Bloom's distinctions certainly suggests the futility of asking closely defined application questions for a brief period of time, and then assuming that pupils 'know' the concept. Through application questions the teacher has an opportunity to return later to important learning from a variety of viewpoints.

Application questions, in the broad sense, might be exemplified by the following questions:

What theorem would you use to find the size of this angle?
What examples of metaphors can you see in the poem.
What principle helps to explain why this container crumpled when removed from the heat?

What other ideas have we encountered that might help us understand this phenomenon?

The use of application questions is further illustrated by the hypothetical situation.

Assume that pupils have been working on a unit in social studies concerned with the nature of subsistence economies, and had noted that in many cases

where there were consistently bad seasons over a number of years, the people were forced to move long distances in search of more productive land. The teacher might ask them subsequently to attempt to explain possible reasons for the apparent biological relationship between the people of central Asia and the American Indians, and the pupils might use their previous learning to hypothesize about the reasons for this migration.

We have used this example to attempt to show that in applying previous knowledge, pupils might make very great leaps in their thinking and may often be incorrect. Though the evaluation of their ideas is of importance, it is *also* important that premature evaluation does not lead students to refrain from taking risks in at least trying to ascertain the relevance of previous learning to a new situation. Application questions offer rich possibilities for involving students in significant thinking.

Analysis

These questions require pupils to break down a communication into its parts, to study the nature of those parts and the relationship between them. They also require pupils to detect the way in which a communication attempts to achieve its effects, both in terms of the devices that are used to create the effect and the way in which the communication is organized.

For example, a group of pupils might study a controversial editorial from a daily newspaper. The teacher might ask the pupils to identify the major conclusions, what decision he was trying to persuade people to reach, what value judgements were implicit in his assertions, what some of the unusual features of the language he used were, and how he arranged the presentation of the points he wished to make. All of these questions are examples of the analysis category.

Or again, some brief examples of analysis questions might be:

> Why does the poet use this word in such an unusual way?
> What reasons do we have for deciding to accept that course of action?
> How could we satisfactorily explain his reaction?
> Why do you think he began the story in that way?
> What aspects of the story would you particularly want to bring out in your play, to capture the feeling of fear the writer represents?

Clearly analysis questions give a lot of scope for pupils to be involved in vigorous thought. As with all the higher levels of categories, however, pupils will need time to develop their answers and to reflect carefully on the question asked. They will also often need encouragement to go beyond their first ideas to more elaborated ones through the teacher's use of probing techniques discussed below.

Synthesis

Synthesis questions involve the building of a new idea, communication, plan or experiment. The essential characteristic is the uniqueness of the product that results from the question. One can therefore only judge whether or not a question falls in the synthesis category by the product rather than the wording of the question. Nevertheless, keeping in mind the criterion of uniqueness, it is possible to find examples of questions which are *likely* to involve synthesis.

The forming of a plan of action may involve the pupils in synthesis. In a Sydney school recently, a group of senior primary pupils faced the problem of

firing the clay pots they had made. They did not have access to a commercilly constructed kiln, but they did have a large clay bank in the school grounds and a lot of dry wood in the nearby bushland. After considerable discussion amongst themselves, they decided to hollow out part of the clay bank and to push small holes from the top of the bank down to the hollow ares. They suggested that if a fire of sufficient size were lit in this area, the heat passing up through the holes would be great enough to at least biscuit their pots. Clearly in this case, they were drawing on quite a considerable body of information, and using this information in a very unusual way to solve their problem.

Devising a set of operations to test a hypothesis or the accuracy of a judgement will often involve synthesis. Imagine, for example, a situation in a social science discussion in which the assertion is made that a majority of pupils in the school would favour legal restrictions on the number of children in a family to two. The establishing of a practical way of assessing the accuracy of that judgement would involve the pupils not only in knowing about ways of gathering information in social settings, but also in devising a set of plans for the best way to proceed in that particular situation.

Some examples of brief tasks involving synthesis might be:

> Devise a poster to sell an imaginary product using some of the techniques of advertising we've discussed.
>
> Write a story which presents a different view of black-white relations than what we have suggested Mark Twain held
>
> Present a report on your survey of the suburb using a variety of media to communicate your main findings.

In the course of a lesson, a teacher will usually ask fewer synthesis questions than questions from other categories. This is largely because pupils will need a lot of time if they are to answer the questions adequately. The asking of numerous synthesis questions may result in superficiality of response and confusion. Experience suggests that it is desirable to follow a synthesis question with a number of probing questions, rather than more questions of the same type.

Synthesis questions lead to the pupils' construction of an *unique* communication, plan or experiment from a group of disparate elements. The important distinguishing characteristic of this category is the involvement of the pupil in devising, making or writing something that is original for that person.

Evaluation

Questions of this type require pupils to make judgements particularly about quality. They quite frequently occur in classroom discussion, but are perhaps not always productive of thoughtful responses. Often pupils are asked to express an opinion on a communication or idea before they have an opportunity to think through carefully what is involved in it and perhaps before they have fully comprehended it. Though, as we indicated earlier, we do not regard evaluation as necessarily involving all the other categories of thinking, it is likely that evaluation questions will be most fruitful after a considerable amount of discussion, either in relation to analysis or synthesis questions. Where evaluation questions are introduced very early, they may well lead to superficial, premature judgements and may also preclude further careful thought.

When asking evaluation questions, the teacher will need to be prepared to handle responses quite different to those he might have had in mind, and to give them equal consideration. The effect of not doing this over a lengthy time might well be to convey to pupils the impression that what they have to say is of no importance. Listening carefully to pupil judgements does not imply that the teacher needs to accept those judgements. Here again, the asking of probing questions will be of value in helping pupils to clarify the opinions they have formed and the reasons for them.

SEQUENCE

Several writers (e.g. Schuman, 1968; Taba, 1971; Hunkins, 1972) have treated the issue of sequence in some detail. The work of the first two authors especially indicates the high level of thought young children may reach through the teacher's careful sequencing of questions. Again, however, a great deal will depend on the insight of the individual teacher in particular situations.

Taba (1971 pp.107ff.) introduced the two notions of 'lifting' and 'extending'. 'Lifting' refers to the use by a teacher of a question which requires the pupils to engage in more complex thinking - for example, to go beyaond the information immediately available in order to infer relationships between phenomena. 'Extending' questions are questions which ask the pupil to provide more examples and instances at the same level of complexity. Taba suggested that for pupils to reach complex levels of thought, they need to have an opportunity to work for some time at a particular level. Broad experience of a range of instances, she suggested, was very important at simple levels of thought. A rapid movement of questions from the simple to the complex, or an erratic movement backwards and forwards between simple and complex levels is likely to lead to confusion amongst the pupils and a falling off in the amount of participation.

[1] from Sydney Microskills. *Series 2 Handbook*. pp. 132 - 140.

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QUESTIONING : HIGH ORDER QUESTIONS

Questions which test knowledge can be described as low order cognitive questions, and questions that create new knowledge in the learner may be referred to as high order questions. In a review by Gall, it was estimated that of all teachers questions:

60% require students to recall facts
20% are concerned with procedures
20% require students to think

But why bother with high order questions? Research by Rosenshine maintains that higher level questioning is positively related to higher level performance in tests and examinations. Almost all studies done have shown that the cognitive levels of student contributions in discussions are closely related to the cognitive demands made by teacher's questions, and evidence would sustain that teachers can raise the level of classroom discussion through the use of high order questions. However, the relationship is not perhaps as clear and consistent as it might appear, as other studies have discovered that in some situations use of high order questions was negatively related to student achievement. What appears to be an important factor is the ability of the teacher to judge to what extent the students are able to respond appropriately to certain types of high order questions.

We can summarise the current situation, that teachers need to know when to use high order questions, as well as developing the ability to develop high order questions.

What are high order questions in more detail? Allen defines them as questions that cannot be answered merely from memory or simply sensory description. A more useful way of classifying high order and low order questions would be to use Bloom's taxonomy thus:

RECALL	Does the student recall what he has seen or read?
COMPREHENSION	Does the student understand what he recalls?
APPLICATION	Can the student apply rules and techniques to solve problems?
ANALYSIS	Can the student identify causes, make inferences and cite examples to support statements?
SYNTHESIS	Can the student make predictions, solve problems or produce new ideas?
EVALUATION	Can the student judge the quality of an idea or problem solutions?

The distinction between application and analysis levels is difficult to utilise in practice and a simplified version is suggested that considers only recall, comprehension, analysis and evaluation.

In the following examples, a question has been made progressively higher, requiring the student to perform entirely different functions.

EXAMPLE 1

Recall	Define the word environment
Comprehension	Why is there so much talk today about environmental or ecological problems?
Synthesis	Plan for the year 2000, deciding what goods and services are essential for reasonable living standards throughout the world which can be actually attained without the danger of ruining the earth.
Evaluation	Which do you regard as the most serious environmental problem and why did you choose what you did?

EXAMPLE 2

Recall	Is education a social science or a physical science?
Comprehension	In what ways would a primary school teacher need to be trained differently from a secondary school teacher?
Synthesis	Plan a new curriculum which would prepare teachers more effectively
Evaluation	What do you think of the proposals for moving teacher education programmes more directly into schools and their surrounding communities?

EXERCISE 1. CATEGORISING QUESTIONS

Classify the following questions into one of the four preceding categories:

1. What did you think of that experience?
2. Who was Martin Luther King?
3. If you were given a choice, would you rather live today or 300 years from today?
4. How do you think this country would be different if there had been no European colonisation?
5. Why do you think doctors earn more than nurses?
6. Why are some television programmes more popular with children than adults?
7. If you were in charge of a television station, what kinds of programmes would you show.
8. How many windows are there in this room?
9. Why do you think we usually put liquids into bottles rather than bowls
10. Why do we fight with words sometimes and with weapons at other times?

EXERCISE 2. CREATING HIGH ORDER QUESTIONS

Convert the following low order questions into high order questions:

1. What is the function of the patella?
2. How do we classify living things?
3. What is one important element in water?
4. What are the similarities and differences between recall and comprehension questions.
5. How would you recognise a case of cholera?

Having converted these questions to a higher level, think of the subjects you normally teach and try to construct some higher order questions in those areas. Write them down and ask one of your colleagues to check them. In what teaching situations could you use these questions?

EXERCISE 3. MODEL TAPE

Listen to the model tape. Identify and classify the questions you hear on the tape. Note where probing questions need to be used.

EXERCISE 4. IMPLEMENTING AND EVALUATING THE SKILL

Prepare a five minute lesson that involves a lot of verbal interaction. Prepare some high order questions for this session, and deliberately probe the students' responses in a variety of ways. Evaluate your performance using the evaluation format.

EVALUATION OF ADVANCED QUESTIONING

	Comments
Which levels of question did you ask?	
Did you use probing questions to assist the students?	
Did you pause long enough after each question?	
Were the questions all clearly expressed?	

EVALUATION

By now, you should have developed a beginning competence in the six basic microteaching skills. There are many others you can acquire as you continue to teach and learn about teaching, but at this point you should move on to assessing your performance overall . Have you met the objectives of this unit ? Check back to the beginning of this unit to remind yourself of what you were trying to achieve overall . In order to evaluate your performance, you should do two things :

(1) Make a model tape that demonstrates clearly at least one of the skills you have just acquired.

(2) Get your supervisor to assess your progress in this unit using the evaluation format on page 101.

PREPARING A MODEL MICROTEACHING TAPE

In this tape, you should clearly demonstrate *at least one* selected skill, more than one if you wish. The tape should be long enough to allow you to demonstrate the skill clearly, and then you should include a transcript of the tape at the same time as submitting the tape.

MICROTEACHING TAPE ASSESSMENT

The following are overall comments on your microteaching tape. Please note the comments both specific and general and act upon them during your period of teaching practice

Setting and closure	
Questioning	
Reinforcement	
Stimulus variation	
Use of explanations	

OVERALL ASSESSMENT OF TAPE

Excellent, clear use of skills, consistent and controlled	Intermittent use of skills, not always clear and controlled	Some skills clear, others not used at all, tendency to revert to own basic pattern	Vague use of skills little control over own behaviour
☐	☐	☐	☐

Signature of assessor .....

Date .....

SUPERVISORS ASSESSMENT

Indicate whether this student:

Plans work well

- ☐ consistently
- ☐ sometimes
- ☐ rarely

During discussion shows evidence of background reading and grasp of principles

- ☐ consistently
- ☐ sometimes
- ☐ rarely

Was able to critically evaluate own performance

- ☐ consistently
- ☐ sometimes
- ☐ rarely

Was able to provide useful feedback to colleagues on skill performance

- ☐ consistently
- ☐ sometimes
- ☐ rarely

Accepts and acts on feedback

- ☐ consistently
- ☐ sometimes
- ☐ rarely

Performs skills with competence

- ☐ All skills (6)
- ☐ some (4 - 5)
- ☐ few (less than 4)

Overall, would you assess this teacher as now having

☐ Clear control of skills

☐ Usually enthusiastic but not always clear demonstration of skills

☐ Poor or vague use of skills

Additional comments:

Signature of Supervisor. . . . . .

Date. . . . . .

TM 110

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UNIT THREE

TEACHING METHODS

OBJECTIVES OF THE UNIT

During this unit the teacher is expected to be able to:

Apply each microteaching skill appropriately and effectively;

Design and use suitable lesson plans when implementing teaching methods.

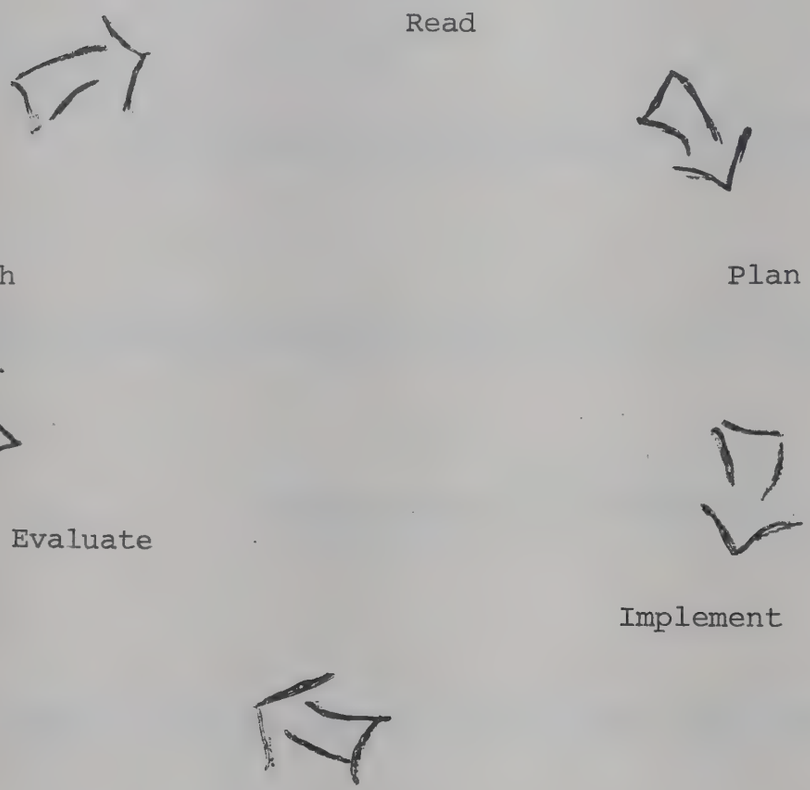
Teach students using each different teaching method.

Evaluate their own and others performance in each teaching method.

Select appropriate teaching methods for achievement of objectives

INTRODUCTION TO THE UNIT

This section of the manual is designed to be used in the same way as the first section. Each teaching method is dealt with separately and teachers are expected to be able to apply all the microteaching skills previously developed in each teaching method. In this unit, there are no model tapes (at the moment) and so the cycle for each skill is as follows:



For each teaching method there is an introduction to the method. This should be read and discussed by the group. Each teacher should then plan a micro lesson using this teaching method and teach to the peer group, recording at the same time. This should then be evaluated by yourself, your peers and your supervisor, and if necessary repeating the method. There is no particular order to the methods and the group can select which order they want to follow.

During this unit, teachers are expected to experiment with each teaching method. Users of this manual are expected to demonstrate a high degree of competence in each of the teaching methods by the time the unit is completed. The evaluation of competence of each of these techniques, will be assessed during teaching practice.

TEACHING METHOD

(1) LECTURE

USES OF THE LECTURE [1]

TO CONVEY INFORMATION.

Lectures can be used to convey information otherwise in a ccessible to the students. For example, a specialist can offer information not available in text books.

TO REINFORCE WRITTEN WORK.

Lectures covering previously learned material reinforces student learning through repetition. Use of these sort of lectures should be limited to emphasis of main points in the material.

CHANGE OF PACE.

Any teaching method used exclusively is boring. A teacher using the lecture method should also employ other methods.

TO SYNTHESIZE MANY SOURCES.

Lecturing is econmical. A teacher is able to synthesize many sources thus saving his students the trouble.

TO INFORM THE STUDENTS OF THE EXPECTEL RESULTS.

Lectures can function as means of informing students of the expected results of a learning activity. If used in this way it functions as an introduction to the activity by focussing the student's attention on the most important aspects of the material.

TO CONVEY ENTHUSIASM.

Lectures can convey to students the teacher's enthusiasm for a subject. An exciting lecture demonstrates the teacher's interest, which will stir the student also.

LECTURE

The word lecture comes from the Latin work "LECTURA" meaning reading. It dates from the Middle Ages, when the religions who were the

1. Extract from Beard R. Teaching and Learning in Higher Education Penguin, 1973.

the main source of knowledge from students, read to them aloud. When the printing press made the widespread dissemination of the written word possible. Teachers and others began to question the continued need for lecture, and the controversy continues today.

If one is to decide for or against the lecture, one then has to think about its intended purpose. A great deal of the research into the comparative merits of lecture and other teaching method. McKeachic (1978) results have sometimes shown the lecture to be more effective, for purpose sometimes revealed little difference between lecture and discussion. Bloom (1953) in his study in which lecture groups were compared with discussions groups, concluded that no matter how skilled the lecturer or unskilled the discussion leader, the least efficient discussion was superior to most of the lectures in promoting problem solving skills. Erickson (1978) in his more recent studies have shown that the lecture can be used effectively to help students to develop the ability to apply concepts and generolize.

What makes the difference is the way in which a given teacher in a given situation operationalizes the term "lecture" and puts it into action. McLeish (1968) says that in lecture system, teaching time is devoted almost entirely to the presentation of information by the teacher. The Hale Committee (1964) reported that students were critical of the lecture as a method of teaching because it was a "one way" process. It is assumed that all students have the same needs and what is given out is received in the form in which it was intended. The students are passive recipients of information, communication is one-way, the teacher talks and students listen. Jean Hayter (1979) argues that, even if there is a verbal interchange between students and teacher, a great deal of active participation on the part of students are by no means passive if they are gaining new ideas, associating those ideas with others, evaluating their previous functioning, and categorizing new concepts gained according to their own personal storage and retrieval system for future use. Bughman (1973). The use of lectures is both defended and criticized by both students and teaching staff alike, but close look at their comments usually reveals that the focus is on the lecturer and not the method on material.

> *"A good lecture is one delivered by a lecturer who is not only knowledgeable but also skilful in his delivery and in establishing a comfortable relationship with students while a poor lecture is one by a lecturer who is ill informed or unable to communicate what he does know"*

Namuddu (1978) - "authors argue that, while much of the criticism is valid it is not the technique itself, but rather its abuse, that is at fault. Used properly and appropriately, the lecture is a valuable tool."

LIMITATION OF LECTURES.

(1) Students Misunderstanding - Students perception of what is said are normally inaccurate as judged by the notes they take, because their previous understanding of the subject is necessarily limited.

(2) Students fading memories - Memory of information presented fades very rapidly at first and more slowly later. In one study, Jone (1923) found that students memory of information faded from 60% immediately after a lecture to 23% eight weeks later. Bassey (1968) like Jones has shown that this loss can be drastically reduced if students are made to go over the information learned as soon as possible after its presentation. Obviously, there is no more immediate time than during the lecture itself. Yet even lecturers who are aware of this are frequently loathe to use interrupted lecture technique. (Informal lecture).

(3) Students declining attention - Thomas (1972) From his study result, he concluded that the proportion of information retained during a lecture declines steadily after an initial settling in period. This decline continues until near the end of an hour lecture when sharp rise in attention occurs. Lloyd (1968) obtained the same pattern when he inspected the lecture notes taken by students. Bligh (1972) obtained the identical pattern. Bligh (1972) suggests that the basic solution to the above limitations is introduction of variety in the lecture. This includes, varied voice, varied methods of presentation, the use of different kinds of visual aids, the introduction of other methods such as small group discussions, general discussion, question and answer sessions, individual problem-solving, rest pauses for students to look through the notes they have taken. Completion of teacher evaluation questionnaires.

(4) Poor Feedback - A lecturer obtain little immediate verbal feedback on his effectiveness. Nevertheless, non-verbal feedback is possible.

* * * * *

THE LECTURE METHOD OF INSTRUCTION

The lecture method continues to be the dominant mode of instruction in contemporary institutions of higher learning and for many reasons, among which tradition, necessity, convenience, and choice are perhaps most prominent. The use of lectures is both defended and criticized by students and faculty alike, but a close look at their comments usually reveals that the focus is on the lecturer and not the method or material. A "good" lecture is one in which the lecturer is not only knowledgeable but skilful in his delivery and in establishing a confortable relationship with students; a "poor" lecture is one in which the lecturer is ill informed, or unable to communicate what he does know. Since evidence suggests that the lecture is likely to remain a principal instructional tool in schools for the health professions, the issues to which this paper will be addressed are the simple things any lecturer who is already qualified in his subject might do to improve the quality of his communication.

1. *PREPARATION.*

Good pedagogy is closely bound to good and effective methods of presenting information, which is another way of saying that among other things a good teacher should be a good public speaker. It is well to remember, however, that an effective lecture rarely happens by accident. Thought, thorough preparation and practice are essential elements of each presentation: the evolution of a lecture plan and the perfection of a technique which is confortable for the lecturer.

Learner needs must be considered first. Unless students recognize some reasons to learn about a subject, it is not likely that they will exhibit much interest in what is being said, even though they may be diligent in taking notes. Any audience has a right to expect the speaker to be interested, interesting, and well informed, and they should leave his presentation feeling that something has been gained from listening. To this end it is important for a lecturer to have some idea of what students already know about the subject of his lecture. Proceeding from an assumption that students already know certain concepts when in fact they are ignorant of them will inevitably lead to confusion and frustration, which are deterrents to learning. On the other hand, presenting already familiar ideas as though students were hearing them for the first time would probably be a waste of time as well as boring. Repetition may be useful, but it should be planned to serve a defined purpose, not be merely accidental. The lecturer must, by some means, determine what students already know about the subject and plan accordingly. One simple method is to administer a pre-test, not in order to make judgements of student quality, but as a guide to development of a lecture plan.

One of the basic sins of many lecturers is the "tell all" complex. Any lecturer needs to be aware of the amount of information that can be absorbed in a given period of time, and it is usually far less than what he wants to communicate. Instead of "covering material", it is far more effective to make a few points well, through illustrations and suggested applications. The focus should be on performance: what is

the student going to do, think, believe or say before the lecture was given. No realist will expect much, but he might expect a few things - and dwell upon them.

2. *PASSIVE AND ACTIVE PARTICIPATION.*

One criticism of the lecture method is that it is a system of one-way communication in which the student is a passive participant - merely a listener. But it need not be so. A skilful lecturer can plan ways of involving students actively in the process. The activity may not be as great or as overt as that which occurs in a small group, but it can transform the nature of the experience. For example:

1. Open the lecture with a series of questions which students should be able to answer at the end of the session. (It is important that these questions in fact be answered by the end).

2. Present a case that sets the stage for analysing a problem. If well planned, the student will reach the solution before the instructor makes it explicit and the instructor's conclusion reinforces the student's learning.

3. Ask rhetorical questions for which students are not expected to verbalize an answer, but to respond mentally.

4. Allow time near the end of the lecture for students to write a summary of what has been presented.

Listeners also become passive when all lectures follow the same format. Variation in method of presenting material is one mark of an experienced, effective lecturer. He may choose to begin with a problem, then use evidence and/or examples that lead to a solution; he may discuss the topic from cause to effect or the reverse; he may more from familiar to unfarmiliar, or from less complex to more complex. In some situations a chronological approach may seem best. The point deserving emphasis is not the specific format but rather that any lecturer should use more than one, and whatever the format he should establish in his listeners a problem-solving set rather than the simpler, but less productive, expectation of being merely a scribe.

3. *THE BEGINNING AND THE ENDING.*

The body of the lecture, the middle part of a presentation, is usually the portion most thoughfully prepared. But its message may be lost unless the introduction and conclusion are developed with equal care.

The main purpose of an introduction is to gain the attention and interest of the audience and to establish rapport. Keeping the audience guessing, or changing the point of emphasis, is a sure way to lose interest quickly. Bowers suggests that capturing an audience is related more to manner, voice, word choice and attitude than it is to subject-matter. a lecturer's attitude and personal involvement in what he is doing often becomes the deciding factor in audience response. Regardless of "how", a lecturer needs to open the door for each student.

So too with the ending. Regardless of how it is done, an effective speaker will draw some conclusion for his audience, help them to see that a purpose has been served. Closing with such a statement "Well, I guess that's about all I have to say .....", or apologizing for what was or was not said, is not only amateurish but also lessens the impact of what has been done. The conclusion should flow naturally from the introduction and body of the lecture. If a series of questions was proposed during the presentation, they need to be answered in the conclusion. The speaker may simply summarize what has been said, suggest ways of applying the information presented, or invite the audience to draw independent conslusions. Generally speaking, the main purposes of a well-planned ending are:

(1) To round out the presentation, eliminate loose ends, and make sure it is tied together;

(2) To focus audience attention momentarily on the presentation as unit;

(3) To suggest ways in which the learning initiated during the lecture might continue.

Another element of the ending which is often overlooked is timing. An effective lecturer will not only be aware of the time allotted but also accept that limitation. The introductory comment that "The topic is obviously too vast to be considered adequately in the time assigned" is a general sign that the lecture is poorly prepared and will not finish on time. Although practice is the best way for a speaker to be relatively sure that he has an appropriate amount of material for the specified time (i.e. not more than can be delivered at a moderate pace and yet enough to fill the time), a topic or sentence outline can help him to stay within the time limit by furnishing a framework of ideas to be presented. Without such a guide, many lecturers tend to ramble, wandering through unproductive byways and getting back to the main topic too late to complete or conclude the principal thrust.

4. *THE FLOW OF IDEAS*.

It is probably self-evident that the teacher/lecturer needs to cultivate an easy flow of correct language that also has colour and force. Two aspects of the use of words are of fundamental importance in this process of communication:

1. There must be a precise knowledge of meaning, so that the words chosen present clear pictures with the desired shading. The use of cliches, Jargon, steroetyped phrases, or terminology which is not adequately defined or explained should be avoided. Mis-pronounciation of words and misuse of terminology arouse a suspicion that other things in the presentation may also be inaccurate. Words that inadvertently convey inappropriate emotion or bias will impede communication of the basic message. The use of words beyond the students' level of comprehension may establish a teacher's expertise, but does little to facilitate his students' learning.

2. There should be a smooth flow of words and ideas so that a listener need not struggle to follow the theme. Sentences should be short and clear, delivered without "um", "you know", "uh", mannerisms that are both distracting and interfere with comprehension. A taperecording for later review, or a colleague to count the number of such interjections in the course of a lecture, can have a salutary effect.

Visual aids are a natural complement to the spoken word. "Good" slides, diagrams, transparencies can clarify or reinforce an idea, prove a point, pork up rather dull material, ledged that a slide prepared with a minimum amount of easily readable material is more effective than one crammed with information, but the frequency with which teachers/ lecturers are heard to say "I doubt if you can see this, but . . . ." suggests that the lesson has not been learned. It is usually better not to use a poor visual aid than to apologize for lack of quality. Demonstrations can be enhanced by the use of models, sections, and plastic specimens, which are becoming more accessible and may serve both to illustrate a lecture and as self-study devices for students working independently.

When using any aid a lecturer must be prepared for the unexpected and ready to deal with it. A chart may slip from its hanging, a slide may be upside down or reversed, the television control centre may not be ready when the sequence is needed, the projector lamp may burn out. If such events cause anger or panic a lecturer will be wise to avoid these crises, for well chosen, well planned audiovisual aids can provide another opportunity for the teacher/lecturer to offer unique, unusual, creative additions that heighten the impact of lectures that are too often dry words alone.

5. *HELP FROM, AND FOR, THE AUDIENCE.*

Just as a teacher/lecturer must be concerned with audience needs as the lecture is being prepared, he must be concerned with audience response as the lecture is being presented. It is perilous to ignore the valuable information being provided throughout any presentation. Shuffling feet, yawns, general restlessness are signs that should be noted with something more than exasperation, for they signal disinterest, or intellectual withdrawal. Puzzlement or whispered questions should suggest that the ideas are not being understood, and some alternative strategy is required. Looks of disbelief or disapproval may suggest rejection of points, which must then be dealt with in a different way. If the lecture is to be effective the lecturer cannot allow an audience to affect him in a personal level, to anger or intimidate him. Audience response or apathy is a cue which the alert speaker uses to advantage in the continuous shaping of his presentation.

Just as he may profit from their response, so may a lecturer make it easier for his audience to profit from his words. A frequently neglected but useful technique in improving lecture effectiveness is the distribution of outline notes. They both provide a guide to the presentation, to which notes and ideas can be added as the lecture progresses, and guide further study. The lecturer may not discuss each segment of the

outline in the class, but at least the student knows what the teacher considers to be the important and essential parts of a particular instructional unit and can plan his studies accordingly.

6. *WHEN SHOULD LECTURES BE USED.*

Accepting the fact that through such techniques of planning and implementation as have been illustrated in earlier sections lecturing can be improved, it is still appropriate to ask when this method of instruction should be used. Yet, as in the case of all other instructional tactics and strategies, a prior question must first be answered: what is the learning objective? It is generally acknowledged that the lecture can be an effective tool in helping students to acquire information but debate continues to rage over whether it is equally useful in helping students to achieve the more complex cognitive goals of analysis and interpretation of data, or ability to solve problems, or even more complex attitudinal objectives. A study conducted by Bloom, comparing lecture groups with discussion groups, concluded that regardless of how skilled the lecturer and how unskilled the discussion leader, in promoting problem-solving skills the least efficient discussion was superior to most of the lecturers. In order to alter attitudes or values a learner needs to be given a chance to make his feelings know, to express his opinions and to clarify his thinking. Thus significant attitude changes are unlikely to occur in the course of a single lecture. On the other hand, one of the major factors in establishing attitudes is an opportunity to interact with a role-model. To the extent that lecturers serve the purpose of providing a clear definition of a specific attitude or an opportunity to observe an appropriate role-model, they may make some contribution to the achievement of this goal as well, but are generally far less efficient than other instructional strategies.

While any number of studies suggest that students and faculty both seem to prefer seminars, discussion, tutorials, or more student centred activities, the empiric evidence is clear that the lecture is not likely to be eliminated - nor should it be. But since the need to lecture seems inescapable, the teacher/lecturer faces the challenge of how to make the lecture as meaningful and as useful as possible. By discriminating use, by careful and considered planning, and by practice directed toward improving techniques the challenge can be met.

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The first reading (Beard, 1973), looked briefly at some of the research about lecturing as a teaching method. The second article gave some specific points about the preparation and delivery of a good lecture. When using a lecture, there are several points to bear in mind about students:

1. Students have selective attention.

2. Students have a limited attention

3. Students need to categorize information.

4. Students need to store information.

5. Students cannot always retrieve information.

The job of the lecturer is to help students overcome these disabilities.

EXERCISE 1. OBSERVING.

Observe a teacher using the lecture method which aspects of the lecture did you rate positively? What would you have done with the negative aspects to improve that particular lecture. Use the evaluation format as a guide.

EXERCISE 3. IMPLEMENTING AND EVALUATING THE METHOD.

Plan a mini-lecture for 10 minutes. Bear in mind the audience you have, and present a topic that can achieve the kind of objectives that are relevant for the use of this method. Evaluate your performance against the evaluation format.

EXERCISE 2. MODEL TAPE-RADIO.

Listed to either the model tape in the department or a radio lecture or talk. Evaluate the whole lecture on the basis of the evaluation format? Decide what would have been improved and how.

NOTE: Keep the lesson plan for this session as well as your notes.

EVALUATION OF LECTURE

AUDIENCE

TOPIC.

COMMENTS.

Teacher varied the tone and the pace?	
Varied the stumulus by using A/V aids?	
Amount of material was satisfactory and delivered at a reasonable pace?	
The material seemed relevant to the audience level and interest?	
The material was well organised and easy to follow?	
Gestures and voice were clear and not distracting.	
Attempts were made to encourage learner participation	

TEACHING METHOD

(2) SMALL GROUP TEACHING

HOW TO USE SMALL GROUPS IN MEDICAL EDUCATION[1]

A. ROTEM AND P. MANZIE.

WHY USE SMALL-GROUP LEARNING IN MEDICAL EDUCATION?

Small group learning enables students to become actively involved in the process of learning. Through interaction with each other and with teachers. They can explore, clarify and practise. Effective learning groups provide opportunities to ask questions, get feedback and share experiences, observations and insights. Assuming the role of active partners in the teaching and learning process, rather than that of passive observers of information, makes students more responsible for their own learning.

In monitoring group discussion, teachers can provide educational inputs in accordance with students' stage of development. Teachers observe and analyse learning difficulties, and identify areas of interest. On the basis of such observations teachers select problems and provide information which are meaningful to the students and which progressively expand students' factual knowledge and improve their reasoning capabilities.

More specifically, it is claimed that appropriately structured small group activities are especially useful in the following areas:

1. Critical thinking and related cognitive skills. Because medical students cannot be taught everything they need to know, they must learn how to retrieve and apply information. Experienced clinicians make decisions by setting up early hypotheses and searching for evidence (Elstein et al 1978). The process often begins with intuition - what Karl Popper (1972) termed 'An act of imagination'. The process of generating hypotheses and eliminating alternative explanations for a particular phenomenon can be learned effectively in small groups.

   The pooled experience and knowledge of group members enables a broader consideration of particular problems. Opportunities to pose questions, seek information, and get feedback enables students to exercise their 'mental computers' and to learn their strength and weaknesses.

2. Ability to communicate. Medical practitioners need to express themselves clearly and to understand accurately both patients and other health professionals. Discussion in a group setting cultivates communication skills. In effective groups students express ideas, seek and offer clarification, listen to others and help the less articulate members through feedback and encouragement. Teachers provide models of good listeners and effective presenters of information.

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[1] From Medical Teacher, 2(2), 1980 pp 80 - 87.

3. Ability to perform as team members and leaders. Solution of problems confronting doctors often entails cooperation with colleagues and members of the allied health professions. The trend towards specialization increases interdependence, hence the need for team skills. Learning group experiences foster interactive skills. Students practice working together. They also get practice in negotiating goals and procedures, in resolving conflicts, and in using each others contributions to promote the group goals. Such practice provides a good preparation for professional team work.

LIMITATIONS OF SMALL GROUPS.

There are five possible limitations to the use of small groups:

1. The use of small groups as a learning milieu does not guarantee the outcomes indicated above. Often, small groups are misused. The need for meticulous planning can be considered as a limiting factor in various learning settings.

2. Some of the major limitations of the learning group derive from logistics. Teaching is more costly in small groups than in large lectures because it requires a higher ratio of staff to students.

3. Group learning could be too slow for brilliant students (unless they are used as a resource for their peers) and inadequate for 'loners' and introverts whom the group might reject or harm in other ways.

4. Some educators find small-group teaching totally alien. Effective lecturers miss the opportunities to exhibit their special talents and become disenchanted with groups. Inexperienced teachers risk feeling intimidated by the unexpected directions in which groups might move.

5. Learning in small groups appears to be no more effective, when measured by traditional assessment procedures, than learning in lectures (Cox and Jaques 1976). However, research by Walton (1968) showed that students taught in small groups had more favourable attitudes towards psychiatry, judged their training as superior, felt more confident and were more interested in psychatric patients.

UNDERLYING ISSUES.

Before offering guidelines for small group teaching we should review the main attributes of small groups.

GROUP PROCESSES.

A group is made up of individuals who are interacting with one another. Interaction is thus a major attribute of groups. The dynamics of groups cannot be fully explained by adding up the qualities of individual members. Kurt Lewin (1951) developed his useful 'field theory' using the analogy of force fields in physics. Group members have 'valences' whereby they attract or level one another, the interplay creating a group 'atmosphere'.

FUNCTIONAL DIMENSIONS.

The learning group has to fulfil two primary functions - achieving educational aims and maintaining itself as a group, thus ensuring its own survival and development. Attainment of goals requires clear direction, proper distribution of labour, appropriate procedures and other organizational arrangements. Maintenance of the group often demands strenuous efforts to resolve conflicts and promote harmony.

GROUP DEVELOPMENT.

Groups develop fairly consistently. In the early period members explore one another's attitudes and feelings, and begin relationship. Bids for status and leadership are common, as are conflicts about substantive issues and procedures. Some individuals may stay outside the area, watching and waiting, others may be very active.

Formation of norms soon follows. Norms might not be stated explicitly, but nevertheless constitute the rules and regulations governing the group. Transition to group maturity may be smooth or stormy. There can be a hot display of true feelings, as well as fierce conflicts for leadership. If the crisis resolves well members relax, feeling confortable or even euphoric, and the group might not succeed in overcoming developmental problems and so disintegrates. The processes of group formation are summarized in Figure 1.

ROLE ALLOCATION.

Group members play different roles. The nature of the roles and the identity of those who accept particular roles are affected by group processes, tasks, goals and external conditions.

No role is essential, even leadership. Nor do groups always match roles with talents. In families, the 'clever one' or the 'beauty', often have no qualifications apparent to outsiders. Surprisingly, people do accept incongruous roles, at great cost. The dissonance, if

not recognized and tabled, may explode as emotional dispute. Groups can punish and destroy by role assignment; a 'scapegoat' suffers deeply. Most hurtful of all is to be given no role.

SENSE OF IDENTITY.

Group identity is reflected in the use of 'we' and 'our' by members. They support each other, tending to fortify their 'oneness' with intolerance of outsiders and other groups. Once a group achieves a certain level of development members become more open to outside ideas, perhaps more confident in the support of their peers, and/or less fearful of external 'take-over'.

SHARED PURPOSE.

Shared purpose is fundamental to group effectiveness. In the short-term there might be conflicts; but without common purpose, disintegration is almost guaranteed.

FACILITATING EFFECTIVE GROUP DISCUSSION.

The success of group discussion will depend partly on decisions you take before the group meets and partly on your role in structuring the discussion and creating a suitable social ambience. The following points should be considered:

1. SIZE.

The size of the group is of the essence. Most writers settle on an optimal range of six to ten members, though where it is hoped to encourage a wide variety of ideas in a 'brainstorming session', a group of ten or twelve may be appropriate. Berne (1970) has suggested that groups of over twelve divide into performers and audience.

2. STUDENT MIX.

Sometimes, it may be a good idea to mix more quick thinking students with those who are slower thinkers, particularly if the aim of the discussion is to solve a problem or to clarify issues which have already been learned more formally. In other cases, however, mixing extroverts with introverts may lead to the former dominating the discussion. Consultation with other members of staff may give you a better insight into students' personalities and abilities (Cox 1979).

3. PHYSICAL CONSIDERATIONS.

You should decide what sort of room will best suit your discussion group: a classroom, tutor's room, laboratory, etc. This, in turn, will

depend on what sort of audiovisual aids you might wish to use: overhead projector, tape/slides, film, video, etc. Such aids can provide an initial shared experience which serves to launch group activity.

4. *PLANNING*

You should find out what competencies students have acquired in previous courses so that you can introduce appropriate tasks (problems). Problems should be challenging but not overwhelming in relation to the group resources. Students' previous experiences in learning groups should be considered in determining procedures for group work.

You should also consider learning activities used in concurrent courses, in order to avoid overload or boredom. Even the most enthusiastic students might become disenchanted and bored in the absence of variety in format and style.

Group activities are especially suitable when:

(a) The learning task requires generation of ideas or recall of information.

(b) It is possible for members to recognize and give feedback in relation to individual.

(c) A division of labour is possible.

5. *THE 'CONTRACT'*

Initial group sessions are critical for establishing members' commitment to group goals. It will be recalled that, at first, group members seek to establish relationship, bid for status, and formulate roles and norms. The group needs opportunities, and at times active facilitation, to form itself; members strive to know what is expected of them and explore what they want to do. Needless to say, you can strongly influence the formation of the group. You may well be advised initially to stress procedures, assignments and other expectations rather than content (Neilsen 1978).

Starting a course with a loose structure can be cumbersomely ineffective, because it is hard to entice a straying group back to the path. If procedures and expectations are set at the beginning (say, during the first two sessions) and if goals of the course are clear, the need for teacher intervention and direction steadily decreases. Students are liberated to explore and discover within explicit boundaries. They depend less on the teacher's telling them what to do.

The learning group must achieve goals but also look after its own maintenance. You are responsible for the creation of meaningful tasks. You also have a role in the development of social and psychological support. The role should not be thought of as a fancy option but as an

essential of group learning. Teachers who are reluctant to facilitate the socio-emotional development of the group should perhaps steer clear of the small-group format.

6. *VARIETIES OF SMALL-GROUP ACTIVITIES.*

In deciding what type of small-group teaching you wish to use, you should consider how it is related to other learning activities in the course where in the course it occurs, whether it is the best way of teaching a particular topic, what are the student's expectations and needs, and what you perceive as your role in it.

7. *FACILITATING LEARNING.*

You can facilitate learning by providing educational inputs and feedback, specifically, you can do this by:

(a) Focussing the activity so that the issues under consideration are clear and the aims of the activity are explicit. Irrelevant exchanges which sidetrack the discussion should be tactfully recognized and avoided. Opportunities for review and preview of material and activities are essential

(b) Clarifying ideas to ensure that they are understood by the group. You can help by providing analogies and examples and by rephrasing and simplifying complex statements. This may include probing the speaker to explain or elaborate. You can provide further information when necessary so that the group gains clear understanding.

(c) Promoting contributions by raising key questions, provoking, waiting quietly but expectantly and supporting contributions by attentive listening and feedback. Selecting appropriate tasks and procedures is a critical factor with regard to participation. You can also help by distributing participation. You can seek the views of quiet students, restrain domonent students and encourage students to comment on each other's contributions.

(d) Achieving closure by summarizing and foreshadowing issues. Medical students - being conditioned to expect concrete results- especially appreciate rounding-off and consolidation of each session. Emotional rounding-off should not be neglected either. When discussion is heated, opportunities and wind down should be provided by acknowledging and dealing with the feelings aroused.

EXAMPLES OF LEARNING ACTIVITIES IN SMALL GROUPS.

CASE PROBLEMS.

Presentation of case problems serves to involve students in problem solving. A case can be presented in the form of a handout, by the use of a

real or simulated patient and/or by audiovideo re ording. Students are required to consider the case, generate hypotheses, pose questions, seek evidence and plan strategies for management. The teacher acts as a resource person and facilitator of the discussion.

Examples of case problems are provided by Cobbs and Griffin (1975) and Simpson (1977) and (1979). Textbooks, journals or real-life experiences provide interesting case material. This method is extensively used in innovative medical schools (for example, McMaster, Canada; Newcastle, Australia; and Michigan State University, USA) which have a problem-based curriculum.

STUDENT PRESENTATIONS.

Student presentations of critical reviews are often used in group learning. To avoid a mini-lecture by the student it is important to encourage discussion during or after the presentation. Lee (1978) suggested asking students to summarize the presentation and to pose some relevant questions to the speaker.

ROLE PLAY.

The role play technique has been used increasingly in medical schools (Lee 1978). Students can be requested to act out various parts, for example, a mother who is reluctant to have her child immunized. While some students act the scene, other students may watch and subsequently provide feedback.

NOMINAL GROUP TECHNIQUE.

An adoption of the Nominal Group Technique developed by Delbecq and Van de Ven (1971) is an effective method of generating ideas in relation to specified problems. The students are asked to consider a problem (say, possible complications or urinary tract infections) and generate a list of points they wish to raise. At first the student think by themselves for may be ten minutes. Then, the teacher requests them to bring up one issue at a time in roundrobin fashion until all students have a chance to exhaust their lists.

The unique attribute of this approach is that all ideas are re orded before discussion commences. Hence, evaluation of ideas is deferred. This is an efficient way of considering a large number of possibilities, of reinforcing lateral thinking and of fostering objectivity.

DISCUSSION IN PAIRS.

A small group session might begin with students discussing in pairs issues raised by the teacher. This approach has the advantage of active involvement and it provides an excellent opportunity for warm-up before group discussion.

TRIGGERS.

The use of triggers, such as a recorded interview of a petient, is useful in conjuction with a discussion in pairs or in small groups. The triggers may provide a real base for discussion and may encourage reference to specifics rather than abstractions

INTERVENTIONS.

You should avoid the temptation prematurely to offer solutions and suggest approaches. The authority role may have to be rejected several times. The mirror technique-reflecting requests for facts or direction back into the group-drives the message home.

Temptation to intervene becomes hard to resist when the group wonders far from the track, when strong bids for leadership meet head-on, or when a member keeps trying to dominate. Aneodotal, humorous or confessional exchanges are often useful in putting out fires. The group should be given every chance to deal in its own way with conflict and dominance. Intervention, if necessary, should be low-profile and, if possible, disguised.

At the same time, you have the right to express your own feelings as a member of the group. Presenting oneself as a "real Person" rather than a 'supper facilitator' is usually well accepted. A "low profile should not entail insincerity. If you do not agree, say so. Moreover, you have a distinct duty to steer the learning situation towards specified objectives. You should not shy away from using your authority to establish order, eliminate confusion, and act for the good of all participants.

Periods of silence can be productive. However, it is useful to have in mind a list of issues to be brought up, if they fail to surface naturally.

All contributions must be taken seriously. An atmosphere wherein there is no such thing as a stupid question enables learning through mistakes and encourages risk-taking.

Group dysfunctions are not unlikely. If non-involvement, clique formation, personality clashes or excessive confusion persist, they block task performance and make intervention necessary.

Detection of dysfunction in often intuitive, rather than a result of careful analysis; sensitivity to 'vibes' is essential. But knowledge of basic principles of group dynamics is a must. You should recognize the dimensions of group process and developmental stages of groups, and you should know how to conduct yourself in a manner that supports the group. This knowledge will aid you in diagnosis and treatment of problems. As in all human endeavour, experience and practice are vital The skills of facilitation can be learned by most teachers.

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More ideas about small group teaching:

The previous article has brought out many important points about small group teaching, but one major amission lies in that it does not consider the fact that not only do teachers need training to use small groups, so do students. Students may well need help in becoming active participants in small groups. What is the leaders (teachers) function in small groups.

LEADERSHIP FUNCTIONS	*LEADERSHIP ACTIVITIES*
1. Create a group and suitable climate for learning.	Informing Controlling
2. Maintain the group as a functioning unit.	Facilitating Advising
3. Focus the attention of the group on the task.	Participating (unobstrusively) Withdrawing (silently)

EXERCISE 1. BRAINSTORMING.

Each participant in the group to spend a few minutes noting down whatever comes to mind about the mentioned leadership activities. Pool these ideas to work out a comprehensive list of possible ways teachers could carry out these activities.

EXERCISE 2. IMPLEMENTING AND EVALUATING LEADERSHIP OF A SMALL GROUP.

Plan a small group activity. Each person in the group should try a different kind of activity so that a broader experience of small group techniques is achieved. The group activity should not last more than 15 minutes. Two members of the group should act as observers/evaluators and will note down each leadership activity shown by you. Discuss where you could have improved the running of the small group activity.

EVALUATION OF SMALL GROUP ACTIVITY

ACTIVITY	*COMMENTS*
Did all members of the group actively participate most of the time?	
Did the teacher create an appropriate climate?	
Did the teacher manage to maintain the group functioning as a complete group?	
Did the group focus on the task throughout?	
Did the teacher withdraw at appropriate points?	
Did the group complete its task in the period?	

TEACHING METHOD

(3) DEMONSTRATIONS AND LABORATORY WORK

HOW TO ORGANIZE AND CONDUCT DEMONSTRATIONS[1]

M. J. BENNETT AND C EWAN.

Guidelines on how to organize and conduct demonstrations require initial delineation as to what constitutes a demonstration. A dictionary definition includes two activities which are relevant to Medical Education. These are (a) the logical proving of some phenomenon and (b) the exhibition and explanation of specimen or experiments as a way of teaching.

These two activities might at first seem to be separate from that involved in giving information by way of lectures, or providing discussion of topics by way of tutorials, or developing motor skills in laboratory exercises. However, it is apparent that such separation is being eroded: the activities encopassed by demonstration are increasingly being incorporated into other teaching methods. Lectures can use televised demonstrations, models and simulations: tutorials may use pathology specimens and slides; and laboratory sessions may also use some or all of these aids to demonstration.

It is clear therefore, that demonstration is not resticted to the activities of an individual whose position is defined as a demonstrator, nor to a particular teaching activity timetabled as a demonstration. Rather, activities of demonstration take place at all stages of the curriculum and can be part of any teaching activity.

We have moved a long way from the situation in the early part of this century when demonstrations were the mainstay of formal medical education. Professors demonstrated anatomical relations. Surgical procedures and clinical signs to arge groups of onlooking medical students. As society changed, opportunities arose for students to assume a more active role in their education-cadavers became increasingly available for students to dissect and the advent of public hospitals opened the way for direct medical students access to patients and clinical cases. Students became participants as well as observers and the role of the demonstration has changed.

WHY USE DEMONSTRATIONS?

How should demonstrations in modern medical education be used and organized?

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[1] from Medical Teacher .

The answers to this question should be discussed against a background of educational theory which asserts that if students need to learn how to do something they must ultimately have the chance to practise doing it until they have achieved a satisfactory level of performance; if students need to learn information it must be presented to them in a context which has personal meaning and can be related to past and future learning; and if students' attitudes are to be shaped they must experience challenges to existing attitudes.

Given this thumbnail sketch of the psychology of learning what do demonstrations contribute to medical education which goes beyond the generality of a dictionary definition?

IF STUDENTS MUST LEARN TO 'DO' SOMETHING ...

Demonstration can be used to show what the desired performance is. Common examples include clinical history-taking, physical examination, laboratory procedures. Remember that demonstration is only a preliminary to practice in this context students must have the opportunity to perform the procedure you have demonstrated. Depending on the procedure and the aptitude of the students more than one demonstration is often necessary.

IF STUDENTS MUST KNOW OR UNDERSTAND SOMETHING ...

Demonstrations can be used for a number of purposes where the aim is to help students comprehend and learn information or facts.

Much medical knowledge is information which is basically visual and must be demonstrated to reveal its fundamental characteristics - anatomy, histology and clinical sciences all fall into this category.

1. Demonstrations can provide practical examples as reinforcement for theoretical concepts. In this context laboratory classes are often used to "prove" to students the truth of facts they have been told in lectures.

2. Demonstrations can augment the learning experience by adding direct visual experience of the concepts to be understood. There is evidence that visual information is more easily recalled than verbal information because images are a more effective means of memory storage than words (Paivio et al. 1963). Demonstrations, if well planned and carried out, can provide this visual imagery for complex concepts; for example, prosected anatomy dissections can provide a visual map of anatomical relations. In this situation, demonstration of the specimen is more efficient than dissection by students because the demonstrator can be sure that all the relevant relations are displayed and, provided dissection skills are not one of the learning objectives, students' time is saved.

3. Demonstrations can be used to pose questions. The use of demonstrations ensures active student participation The danger with most types of demonstrations is that students lapse into passivity. This can be avoided by using demonstrations which provoke questions. For examples, in a microbiology class students can be shown a culture in which a colony of Haemophilus infuensae grows more profusely in the vicinity of Staphylococcus aureus, and must then ask themselves why.

4. Demonstrations can be used to explain or describe information which is basically visual and therefore difficult to deal with verbally. One example is the embryology of cardiac development where demonstration using a pliable tubular model is invaluable. Another example is the demonstration of paper chromatography for separation of amino acids.

IF STUDENTS' ATTITUDES ARE TO BE SHAPED ...

Demonstrations may be useful to illustrate to students the suitability or otherwise of certain attitudes involved in the skills and knowledge they are learning. If attitudes are to be shaped there is no substitute for direct experience; however, if, for logistic reasons, this is not possible then a well-planned demonstration can be a source of vicarious experience. Trigger videotapes or films which demonstrate an avent can be used to challenge existing attitudes and promote discussion and attitude change.

HOW SHOULD DEMONSTRATIONS BE PLANNED?

In the preceding ways demonstrations contribute to learning if they are well planned and effectively implemented. Demonstrations are, in effect, a learning resource which, like any other resource should be used to achieve epecific purposes and designed accordingly. Steps in the planning sequence should be:

1. What is the educational purpose (objective) of the demonstration?
2. What are the main points to be made in the demonstration?
3. What resources will be required to carry out the demonstration?
4. What activities can involve the students and extend the educational purposes of the demonstration?
5. How can the effectiveness of the demonstration be assessed?

STEP 1. WHAT IS THE EDUCATIONAL PURPOSE (OBJECTIVE) OF THE DEMONSTRATION?

Most teachers are by now aware of the uses of objectives for learning (Engel 1980; Simpson 1980) You may or may not prefer to specify detailed objectives for your students; nevertheless you must make use of some form of objectives in your teaching. Most teachers know what they want students to get out of a particular lesson and these are their learning objectives. Some learning objectives will require several different teaching sessions to achieve, in other cases the same learning experience may contribute to a number of different objectives. Teachers must think about their objectives for a particular teaching session and decide what teaching methods and resources will be the most valuable aids to learning. The objectives for learning to which demonstrations can effectively contribute are discussed in the earlier parts of this paper. Be careful that you are not expecting too much from your demonstration. The demonstration may be a valuable part of the learning which is required but it may not be sufficient to achieve the objective by itself.

Use demonstrations where you want to:

- Give an overview of a procedure or task so that students will know what is expected of them.
- Provide a visual experience of a phenomenon which is difficult to explain verbally.
- Use a phenomenon to pose a problem for students to solve.
- Create a vicarious experience to influence students' knowledge or attitudes in an area where direct experience is not possible.

Remember, if your objectives include the expectation that students will be able to carry out a task or performance or to solve a problem or to exhibit certain attitudes, a demonstration may be a necessary component of the instruction but it will not be sufficient. Additional opportunities will have to be provided to allow the students to practice the tasks, to attempt to solve the problem and to experience attitudes and feelings at first hand.

STEP 2. WHAT ARE THE MAIN POINTS TO BE MADE IN THE DEMONSTRATION?

Once you have decided that a demonstration is appropriate for your objectives for the teaching session, you must begin to plan the demonstration itself. Students and teachers are frequently frustrated by demonstrations that do not work or that are not seen to be directly relevant to the lerning expected of the students. This may be because teachers have not stopped to think through the demonstration and to identify those aspects of it which should be highlighted. Teachers may get over involved in the technical development of the demonstration. To

avoid this you should list those aspects of the demonstration which require special comment in the sequence in which they will occur.

Begin the demonstration by telling the students briefly what will happen and by pointing out to them the main points of which they should be be aware. As you proceed through the demonstration, reinforce those main points as they occur and inlist the aid of some of the students in noting down observations at those key points. By providing such a road map you will ensure that students do not become lost in the mass of technical details which are likely to distract their attention. This problem is particularly relevant in demonstrations which involve unfamiliar equipment and techniques which may attract the students' attention at the expense of the actual outcomes of the demonstration itself.

At the end of the demonstration ask the students to summarize the lessons learned - of course, you should warn them at the beginning that you intend to do this or you will be a very unpopular demonstrator indeed.

STEP 3. WHAT RESOURCES WILL BE REQUIRED TO CARRY OUT THE DEMONSTRATION?

It goes without saying that you will have assembled the necessary technical equipment or materials for your demonstration beforehand: however, it is worth thinking beyond that level to determine whether there are any additional resources which are necessary, not for the demonstration itself but for the learning that should result from it. For example, you may be demonstrating how to use a Bird respirator. A demonstration of the setting of the controls of this fairly complex piece of machinery is always difficult for students to grasp because they need to understand its basic mechanism in order to understand the way the controls work.

For such a demonstration you would need a functioning machine but you would also be wise to use a machine which had been dismantled in order to show the internal connections of the controls. Diagrams can be used to complement the demonstration. You could use the diagrams as slides or as overhead projection transparencies, or you could provide copies as handouts for the students.

STEP 4. WHAT ACTIVITIES CAN INVOLVE THE STUDENTS AND EXTENDED THE EDUCATIONAL PURPOSES OF DEMONSTRATING?

This question deserves a lot of attention from the demonstrator. Almost by definition, the term demonstration implies that the audience will be passive. This creates a dilemma for the teacher because most will accept that passive audiences do not learn well. The teacher must therefore devote considerable attention to avoiding this inherent problem of demonstrations. One of the biggest obstacles facing students in groups larger than a handful is that demonstrations are often not easily visible. The first step in discouraging passivity is to ensure that all

students can at least see what is going on. This may necessitate repeating the demonstration to a number of smaller groups or it may call for videotaping and closed circuit transmission of the demonstration to monitors strategically placed around the room. Some demonstrations, because of their sensitive nature, benefit a great deal from this ability to videotape and transmit to an audience in a different room. This may be the case in demonstrations of patient interviews or physical examinations, where the patient has given permission to be taped but is more confortable with just the interviewer in the room than with a group of onlooking students.

Given that all students can see and hear the demonstration, the next problem becomes one of maintaining their interest in the demonstration. This difficulty will not be so evident in situations in which the relevance of the demonstration to clinical practice or examination topics is obvious; however it can be very real in situations where the students will not be expected to perform the task being demonstrated and where the demonstration is intended merely as a visual reinforcement of information which has been given elsewhere. Students often see this type of demonstration as time-wasting repetition and do not give it their undivided attention. A more profitable use of such demonstration occurs when the teacher uses them not merely to reinforce but also to provide an opportunity to apply knowledge learned elsewhere. For example, if we consider a pathology museum as a static demonstration for the purpose of providing visual reinforcement of information about pathological conditions, and as an opportunity to practice recognizing those conditions, active student involvement in applied learning can be encouraged by providing case histories for each specimen and exercises in the museum manual for the student to work through when attending the demonstration.

THE NEED TO REVIEW DEMONSTRATIONS.

Because demonstrations have a time-honoured role in the medical curriculum, individual demonstrations can easily take on a life of their own. Conventional timetabling arrangements reinforce this tendency, since it is usual to schedule practicals and demonstrations routinely to follow lecture topics. When the demonstration has taken considerable time and equipment to develop there is a tendency to bring it out and use it at regular intervals almost without regard to its educational benefits.

Demonstrations should be reviewed regularly to find out what the students are achieving from them. Do they relate the demonstration to the topic discussed in lectures? Indeed, does the demonstration add anything at all to the students' ability to develop their understanding of a topic? In what ways can the value of the demonstration be increased by using other activities such as practice, supplementary reading, or interpreting results in relation to an actual case history?

For example, it might be generally agreed that a particular demonstration is used to enable students to observe the effects of a biochemical imbalance, brought about by use of a particular drug, on synaptic transmission. Such a demonstration might be seen as quite elegant,

and judged by the students as interesting. However, it can also be built on so that students are asked to determine what would happen if the drug's dosage were increased, or if a patient had a particular condition. The use of the demonstration can be developed by requiring students to work either individually or in groups on a case history which has been provided during the demonstration.

THE NEED TO SECURE COOPERATION.

There is an important practical consideration concerning supplementing demonstrations in order to achieve wider objectives, namely obtaining both intra - and interdepartmental cooperation. Within a department it is necessary for those giving the lectures to be aware both of the demonstrations that are being given in laboratory classes and of difficulties students are having with understanding them, or the misconceptions which they might might have brought with them from the lectures. Interdepartmental demonstrations offer a good opportunity to provide some degree of integration. For example, when dealing with a topic in embryology (whose three-dimensional nature lends itself well to demonstrations) a staff member from paediatrics can be invited to point out the pathological variations which can occur. Such inter-departmental cooperation can serve to achieve broader clinically relevant objectives.

STEP 5. HOW CAN THE EFFECTIVENESS OF A DEMONSTRATION BE ASSESSED?

The effectiveness of demonstrations must be assessed for the obvious educational reasons of measuring whether objectives have been achieved (summative assessment) as well as of improving the organization and conduct of demonstrations (formative or diagnostic assessment). Summative assessment is made easier if the examinations are developed systematically to cover the learning objectives of a course. Then student performance on those objectives covered by particular demonstrations can be compared within years, as well as monitored from year to year.

Assessing the effectiveness of demonstrations also lends itself to simple experimental studies. Students are normally divided into groups for laboratory classes, but half of them might have had a demonstration plus a clinical case, whilst half might have had a demonstration only. In this way, variations of a demonstration can be both developed and monitored for effectiveness of student learning.

Diagnostic or formative assessment is an ongoing part of a teacher's activity. Such assessment will be easier, however, if teachers develop demonstrations according to the steps outlined above. Because of the tendency for teachers to see demonstrations as important in their own right, they can easily accuse students who seem disinterested or unable to answer questions of being interested only in facts and examinations. However, if you have thought through a sequence of considering of considering which objectives demonstrations can achieve, what the main

points being made in the demonstration are and how the demonstration can actually involve the students, then you will focus more easily on how to improve the demonstration rather than on blaming students for their inattention.

CONCLUSIONS.

Demonstrations can contribute significantly to the learning experience if their inherent advantages are exploited. Too often teachers follow the standard formula "tell them (lectures), show them (demonstrations) and ask them questions (tutorials)" without regard for the overlap in content or the deficiencies in understanding which may result. Systematic planning ensures that each teaching activity provides the learning experience for which it is uniquely suited. Demonstrations are useful in some contexts and time wasting in others. This paper may help you to identify the most suitable contexts and to plan your demonstrations accordingly.

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We have placed demonstrations and laboratory work together since they are essentially similar techniques and approaches.

PURPOSES FOR WHICH LABORATORY TEACHING IS BEST.

1. Teaching relevant skills. It can provide students with concrete experiences and eventually complete skills in the relevant areas.

2. Understanding processes of scientific enquiry. This may or may not be necessary in the teaching of allied health personnel. The level of scientific enquiry can be pitched at the relevant level. Fig.3.1 suggests a scheme for determining the level of scientific enquiry a laboratory investigation such as Fig. 3.2 would be classified at 2A level.

FIG. 8 : SCHEME FOR DETERMINING LEVEL OF SCIENTIFIC ENQUIRY OF LABORATORY EXERCISES.

Level	Aim	Materials	Methods	Answer
0	Given	Given	Given	Given
1	Given	Given	Given	Open
2A	Given	Part given or Whole	Open or Part given	Open
2B	Given	Open	Open	Open
3	Open	Open	Open	Open

(after Cox and Ewan Medical Teacher p.92)

FIG. 3.2. A LABORATORY INVESTIGATION EXERCISE.

Antibiotic sensitivity testing.

Material: 10 tubes of melted agar (in 52° saterbath)

10 sterile petri dishes

Culture of penicillin sensitive staph.

15 discs penicillin G (2mg)

Procedure:

Students at each bench should plan a simple experiment to determine what variables could influence the size of a zone of inhibition around an antibiotic disc other than inoculum size. The material listed above is available for this experiment

3. *APPRECIATE THE ROLE OF THE DIAGNOSTIC LABORATORIES.*

By working in the laboratory situation, students can come to appreciate the significance of laboratory investigations within the overall context of health care and health services. If students can also follow up their laboratory work into the clinical setting, they can gain a further appreciation of the role of laboratories.

4. *APPLICATION OF KNOWLEDGE AND METHODS TO RELEVANT CLINICAL OR HEALTH SITUATIONS*

This can help students who otherwise do not do a lot of laboratory work, such as clinical officer, nurses, public health officers, to relate investigations or laboratory work to their normal work.

5. *MOTIVATE AND INTEREST STUDENTS.*

Laboratory exercises can arouse interest in most students in most students in a wide subject area and can challenge and stimulate students.

6. *INFORMAL CONTACT WITH STAFF AND STUDENTS.*

Laboratory settings, suitably organised, give excellent opportunity for easy staff-student and student-student interactions.

1. Allow sufficient time for learning, practice and feedback.

2. Explain the relevance of the technique or skill.

3. Clearly demonstrate, if a skill is involved, so that all students can see and hear everything.

4. Organise sufficient and correct materials for use in practice.

5. Where appropriate create a challenge to the students to have to think through the problem or investigation.

Exercise 1. Observe a demonstration or laboratory session. Using the evaluation format decide whether you consider the session effective or not. What could have been improved? If it is a laboratory exercise, analyse the level of scientific enquiry. Is it appropriate, too low or too high?

Exercise 2. Observe the model tape. Do a similar evaluation as previously.

Exercise 3. Plan a complete series of demonstrations or laboratory exercises for your own subject area. Submit this for evaluation.

Exercise 4. Plan and carry out a demonstration lasting about 10 - 15 minutes. Evaluate your performance.

EVALUATION OF DEMONSTRATIONS/LABORATORY WORK

	COMMENTS
Were students encouraged to think during the session?	
Was there adequate opportunity for all students to practice the task or skill?	
Could all students see and hear clearly?	
Were instructions and/or materials for students well prepared?	
Was the interest of most students stimulated?	
Was the topic clearly related to the relevant practical setting and to previous learning?	

TEACHING METHOD

(4) CLINICAL PRACTICE AND FIELDWORK

TEACHING CLINICAL SKILLS IN THE HOSPITAL SETTING[1]

W. McCARTHY

Clinical skills, the ability to take an adequate history, to perform an adequate physical examination, and to be able to put the outcome of these efforts into a presumptive diagnosis and differential diagnosis, are basic to clinical medicine. While much of the content taught in undergraduate medical education is in dispute, no one questions the need for the undergraduate to be competent in the essential skills of history taking and physical examination. Nonetheless, like all other teaching methods, the methods used for teaching clinical skills are subject to much comment and criticism. In particular, the traditional bed-side teaching is noted to be subject to variables such as the availability of patients, the nature of the patients in the major teaching hospitals, the ability and enthusiasm of the clinical teacher, and even the personality of the charge nurse in the ward. One critic of traditional bed-side tutorial as 'shifting dullness'.

A basic tenet of clinical instruction is that there is no better teaching medium than an enthusiastic teacher, a patient with illness, and a small group of enthusiastic students. This tenet is not disputed; the following recommendations are designed to assist the clinical teacher to maximize the advantage of that situation. This chapter outlines some ways in which traditional bed-side teaching may be enhanced and describes other methods useful for teaching clinical skills.

RECOMMENDATIONS FOR BEDSIDE TEACHING.

1. Be on time. Nothing dissipates student enthusiasm more than standing around in a corridor waiting for a tutor.

2. Insist that your students arrive on time. It is unfair to the other students and irritating for the teacher for one or two students to be late.

3. Plan your clinical teaching session. The teacher should spend time before the listed starting time visiting the patients involved in the teaching session to obtain their permission and to explain the format of the teaching session. The patient is thus integrated into the session and the teaching becomes easier for everyone concerned. The teacher also has time to have a brief look at the patient to confirm the history and clinical findings, and perhaps discover other suitable conditions the patient may have, and to perhaps even find other interesting patients in nearby beds. It is surprising how often patients have physical signs unrecorded on teaching lists or in the patient's clinical notes. Of great value to the teacher during this preliminary visit, is a discussion with the registrars and residents in the ward to ascertain the availability of other patients for teaching in that ward.

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[1] in Cox, K and Ewan, C. The medical teacher pp. 102 - 104.

4. Involve the patients. The teacher, the patients and the students will all enjoy a teaching session if everyone is involved. Allow the patient an opportunity to present information and to demonstrate his or her signs to the students. It is poor medicine and poor teaching to use the patient simply as a collection of interesting historical facts and physical findings without ensuring that the patient feels he or she is contributing to the students' learning. I have rarely found a patient unwilling to participate in a teaching session and who does not enjoy the session, provided that the teacher took time for a preliminary visit to talk to the patient, and provided that the session itself does involve the patient directly in the students' learning. Thank the patient for participation on the completion of the teaching session.

5. Inform the Charge Nurse during the preliminary visit of your intention to bring students and ensure that the patients will remain in the ward. Quite often, patients with interesting physical findings are in the pre-operative phase and will be sent to the X-ray department or elsewhere, unless you inform the nurses that you will be returning with students. At the same time, you can enlist their co-operation to provide for your appropriate X-ray films and other investigations which may not currently be in the ward.

6. Involve all the Students. Although one student may be given the main task of eliciting the history and examining the patient, all students should be given an opportunity to ask questions of the patient and to undertake examinations of most of the patients during a session. With larger groups this may not always be possible, but the more involvement individuals in the group have in the teaching session, the better will be their response and the better their learning.

7. Insist on a standard format for the history and a standardized approach for physical examination. Unless students learn and stick to a 'drill' approach to the taking of a history and the physical examination, important historical facts and important physical findings will be overlooked. If this standard approach to history taking and physical examination is insisted upon for the junior students, then it will not be necessary to be so insistent with the more advanced students.

8. Use a problem-solving approach. The basic principles of the problem-oriented approach are ideal for clinical teaching. Insist that the students derive from the patient's history and physical findings the problem that the patient sees as important, the problems the clinician will have to solve, and the problems the relatives and friends will have as the result of the patient's illness. Taking such a problem-based approach to the history and physical examination will ensure that the students develop a

holistic approach to patients in their clinical practices. My own approach is to use the questions "What are this this patient's problems? and "What problems will this patient and the relatives have as a result of this illness or its treatment?

9. Conduct discussion of differential diagnosis and therapy away from the patient, unless it is your intention to use the teaching session as a method of educating the patient. Should the patient be your own patient, then it is quite legitimate and often very useful to discuss the patient's condition with the students with the patient present. The terminology will be varied to suit the patient but it is quite possible and often very helpful to the patient to conduct the tutorial in this way. Patients have repeatedly informed me of the value they have received by listening in to the tutorial. Done with care, it is an ideal way to combine clinical care with undergraduate teaching. For other discussions, leave the bedside and retire to a nearby tutorial room where a blackboard, chalk and other teaching aids will be available to complete the teaching component of the session.

10. Do not try to do too much. Three or four cases per teaching session are an appropriate load for students to accept. For more complicated patients, one or two patients per session are adequate. End all teaching sessions on time. Students will be happier to attend if they know they will not be kept from other activities by a long-winded teacher who feels that all sessions should deal with all topics in full detail. My suggested time for a clinical teaching session is one and a half hours.

TEACHING CLINICAL SKILLS AWAY FROM THE BED-SIDE.

Clinical skills can be taught in the absence of a patient. The following techniques should be considered as complementary to bed-side teaching techniques:

1. Video-tape recall. The analysis of patient history by video-tape recording is very useful and acceptable to students. A taped interview of a patient by a skilful interviewer is presented to the students in small segments. The student is asked to consider each of the patient's symptoms and to hypothesize about its meaning in terms of patho-physiology. As the history develops, the student is asked to group complexes of symptoms into possible diagnoses and differential diagnosis.

2. Drill sessions. For beginning students the steps in a history and physical diagnosis can be practised on patients without interesting histories or any physical findings. Some of your ward patients can be co-opted into such an exercise; and provided they are not over-examined, they are usually only too willing to allow the students to practise the steps in the history and physical examination. Such a technique is useful only early in the student's development.

3. Simulated patients. For teaching history-taking, the teacher or the student can simulate a patient with an illness. My practice is to do the simulation myself by providing the student with appropriate responses to the historical questions. The students as a group then attempt to analyze the history as presented by me. Following some experience in this technique, I arrange for each student to read up a specific illness and simulate the history for the rest of the group. This technique can also be used for larger groups of students; I have asked it for as many as sixty students. With large groups of students, one student plays the interviewer and one the patient. After the interview, I direct questions about the interview to the whole group of students. This method seems to be highly acceptable to students; it brings out their detective instincts.

4. Discussion of multiple choice questions. This technique is more useful for teaching clinical knowledge rather than clinical skills.

However, it is possible to present, in multiple choice format, information about a patient which is inadequate to provide a diagnosis. The students then elicit from the teacher whatever information they require in their attempts to analyze the history or findings presented. In this way, a dialogue between the teacher and the students about the meaning of various historical and physical findings can be generated. The students like this technique, but I think it to be less effective in the teaching of clinical skills than the other techniques outlined above.

The most valuable way of teaching clinical skills remains the bed-side tutorial. I would encourage all teachers to exploit its potential to the full and where possible, to use the patient care situation for the teaching of clinical skills. With the expenditure of some preliminary time in planning the session and visiting the patients, these sessions will remain the highlight of all undergraduate medical curricula.

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SUPERVISING FIELD WORK

The reading has highlighted some interesting aspects of teaching in the real situation, and this is the basis of all field work or clinical practice. It can be defined as -

The instruction that occurs in settings and situations in which the student is giving direct care to real clients as part of a planned learning activity.

There are three critical elements that need to be considered

1. Planning
2. Supervision
3. Evaluation

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PLANNING.

The giving of direct care to real clients can be implemented in many ways - for a sustained period of several weeks or months, or short periods of a few hours every week. It can occur throughout training or be implemented in one or two major blocks of service. The decisions about these are curriculum decisions and are affected by factors such as finance, transport, philosophy of programme and so on. However, teachers need to evaluate several aspects of the clinical or field site before assigning students. They should consider:

1. Does the area give the type of experience required?
2. Are there adequately trained personnel in the area or the field?
3. Are the facilities appropriate?
4. Are there adequate support staff, if required?
5. Are the educational attitudes of unit personnel desirable ones?
6. Is the area well managed?
7. Are the educational objectives of the programme well defined?

Only if the answers to these questions are sufficiently positive should students be put in any clinical or field placement.

The period of field placement is not the place for learning new skills. But for refining and improving an existing skill and extending the range of competencies and complex skills. Objectives for the experience should be designed with this in mind.

SUPERVISION.

Having sent the student into field placement, the job of the teacher is then -

> *primarily supervisory. Effective supervision are those actions, activities and verbalisations that facilitate student learning in the clinical setting.*

Studies have shown that there are many styles of clinical teaching and supervising, but that they boil down to a major dichotany, between, 'facilitation' and 'interference'

FIG. 9. : PATTERNS OF SUPERVISION.

	FACILITATIVE	*INTERFERENCE*
1.	Available in clinical area. Provided role model.	Not available in clinical or office setting.
2.	Willingness to help and supportive.	Takes over assignments.
3.	Gives verbal encouragement, challenge to learn and to develop own objectives.	Has unrealistic expectations.
4.	Knowledgeable. Can demonstrate or explain new procedures.	Unfamiliar with clinical setting.
5.	Answers questions. Helps identify learning needs. Assists with problems.	Meets own needs first.
6.	Allows students to recognize and correct own errors, helps see alternatives, provides individual and group conference time.	Does not recognise individual differencies.

The implication derived from the above must be that adequate supervision requires the supervisor to be around the student a lot of the time and be technically competent, familiar with the area and skills.

EVALUATION.

Evaluation is the major function of supervision in field placement whether it is done by the field staff, college supervisor or both. Studies have shown that -

1. Supervisors who are in a position to compare students with several others are likely to give more valid measurements than are teachers with whom students are working.

2. College supervisors tend to stress different qualities from those which are seen as important in the field.

These conclusions are problematic and mean that evaluation instruments must be well developed and tested if evaluation s in the field are to be a valid part of overall student evaluation. Whoever is doing the evaluations,

and there is a strong case for using both sources, the organisation of evaluation can either facilitate or interfere with the students experience.

FIG. 4.2. PATTERNS OF EVALUATION.

FACILITATIVE	*INTERFERENCE*
Clearly defined expectations.	Lack of clearly defined expectations.
Gives positive feedback but honest and constructive criticism.	Gives only negative feedback.
Prompt and regular feedback.	Late and insufficient feedback.

EXERCISE 1. DISCUSSION.

Do you consider the field work of students in your own school or department is satisfactory? When do you think students should have field work experience? Discuss this as a group and try to come up with a 'Field work Manifesto' for health training institutions.

EXERCISE 2. OBSERVATION.

Go into an area where students are on attachment. Establish whether the objectives have been specified for the experience. What is the pattern of supervision? What is the pattern of evaluation?

EXERCISE 3.

Try out a period of supervision of a student or groups of student or groups of students, of a morning or a working shift. Afterwards try to evaluate your performance.

EXERCISE 4.

Plan the fieldwork placement for one or a group of students including the objectives, the supervision and the evaluation.

EVALUATION OF FIELDWORK PLACEMENT

	COMMENTS
Was the area(s) assessed for suitability?	
Was the pattern of supervision primarily facilitative?	
Were the objectives clear and relevant?	
Was the pattern of evaluation primarily facilitative?	

TEACHING METHOD

(5) SIMULATION

SIMULATIONS[1]

WHAT IS SIMULATION?

Different authors gave meanings to simulation as a dynamic representation which employs substitute elements to replace real of hypothetical components (Brown, Lewis, Harcleroad). Another author defines it as a general term referring to constructing and operating on a model that replicates behavioral process (McGuire and Weseman). Simulation is also defined as a social system in a miniature, a model of an organization, a nation or a World, a laboratory analogue by which a wide variety of social situations can be replicated (Barrows). From the above meanings one can summarize that simulation is a representative or imitation of a real life situation which is very important and used in teaching [illegible], in training device and as research tool depending on the curriculum and the ability of the learner. It is [illegible]

THE ESSENCE OF SIMULATION.

Reduced to its essence, simulation consists merely in placing an individual in a setting that imitates some aspect of reality, and designing around that setting a problem which requires the learner's active participation in initiating and carrying through a sequence of inquiries, decisions and actions. The total situation must be arranged so that each of the learner's activities triggers appropriate feedback which he can utilize in subsequent decisions about pending action, decisions which may in turn modify the problem. Certainly one of the most important characteristics of simulation is that a problem can be initiated in standard form for everyone but can evolve in quite different ways depending on the unique configuration of interventions each respondent makes. (McGuire and Wezeman).

In whatever form the simulation takes such as live simulation, computer assisted simulation, reproductions of clinical data or three demonsional simulation models, all can be used to present problems in realistic form that:

a. Enables the students to learn and requires him to demonstrate what he has learned, what behaviours are required in the setting.

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[1] Material for this article was drawn from ShortA Tomlinson D. How to use games in medical education; Medical Teacher, 2(3) May, June 1980, 116 - 117; and McGuire C. Simulation in instruction and evaluation in Medicine, PHP 52, WHO, Geneva, 1974, 18 - 34.

b) Permits life like feedback from simulator

c) Makes the students cope with the sequence of events as they occur as a result of his intervention.

TYPES OF SIMULATION IN CURRENT USE.

The various types of simulation outlined below are based on a recognition that clinical and laboratory data come through many sensory modalities (e.g. Visual, Auditory, tacticle) and that highly complex cognitive and psychomotor skills are involved in gathering and processing such data. These important facts are commonly ignored in much of the teaching and most of the testing characteristic of medical education, where all too frequently almost exclusive reliance is placed on verbal descriptions of highly complex and varied phenomena and processes.

a) Reproduction of Visual and Auditory Stimuli. The utility of photographic reproductions of X-rays, lesions, gross microscopic specimens, tracings of electrocardiograms, or electro-encephalograms and the like all presented in a form that imitates life as closely as possible - has long been recognized. More recently electronic techniques have been developed for playback of high-fidelity recordings of heart, broath and abdominal sounds, using individual stethophones in a manner that simulates the way in which a physician hears such sounds in his examination of a patient. Similarly, high quality motion pictures or videotapes depicting interviews and examinations of patients are generally recognized as invaluable for the presentation of those data require a combination of sound, colour and movement.

b) Three-dimensional Models. More recently, prototypes of several three-dimensional simulators (e.g. breast, pelvis, prostate, eye, ear, larynx, infusion arm, intubation, spinal tap etc.) have become available. Varied pathology can be inserted in these devices to assist the students physician in learning and to require him to demonstrate that he has mastered the skill of using sophisticated instruments to elicit the findings and to interprete them.

c) Automated robots. As an indication of the level of realism that can even now be attained in three dimensional models "SIM" I is a computer "Cardiac Simulator" may be instructive. "SIM"I is a computer managed, extra-ordinarily life-like robot which can be programmed to present combinations of findings that can be modified in an almost infinite number of ways, to simulate a variety of problems and respond appropriately to different interventions of the anaesthesiologist. "SIM"I may even die if the student manages it in appropriately or responds inadequately to changes in its condition. The "Cardiac Simulator,

though not computer-managed, is equipped with a large number of programmes that present varied auscultatory findings, coordinated with appropriate visual pulses built into a life-like torso.

d) Paper Pencil Simulators. At the other extreme of the cost continuum are the written of clinical problems widely known as branched problems in patient management, designed to imitate the decision-making process involved in the work-up and management of a patient. In these problems a clinical situation is introduced with a brief statement of a complaint such as a physician might elicit from the patient himself, from a friend or relative who accompanied him or from a colleague who referred him. It may consist of a few written lines or a brief film clip in which the patient indicates his reason for "seeing the doctor".

The statement of the problem is followed by a list of interventions or of general strategies, from these an initial approach may be selected, e.g. further history, physical examination, laboratory evaluation or immediate therapy. This decision is recorded by erasing the opaque overlay or developing the latent image on a specially treated answer sheet to reveal the requested information or further instructions.

This type of paper-and-pencil simulation has been found suitable for both diagnostic and management problems ranging from emergency to long-term chronic disease conditions that may involve psycho-social, as well as organic, factors. Recent technical developments make it possible. For local faculty members to initiate such simulations and to reproduce small quantities of them in latent image by means available in secretarial office and at a cost comparable to other inexpensive duplicating procedures.

e) Computer-Aided Simulations. A rationale analogous to that used in the construction of written simulation has been employed in the development of a variety of computer-assisted simulations of the clinical encounter. Though the details may vary, in essence they are all designed to imitate some aspects of the decision-making process in the investigation and management of patients.

In some of such simulations the student makes selections from a list of options presented by the computer, in others, he must formulate his own inquiries and interventions with neither the assistance nor the constraints of a list. For example, in the CASE format, developed at the University of Illinois, the computer takes the role of a patient and the session is introduced by a computer statement describing the setting (Physician's Office, Hospital, emergency room, etc) and the patients age, sex and general appearance. The computer may go on to state, as a patient would, the reason why the patient has come to see the physician. Or alternatively the session might simply begin as follows.

Student: What brings you to see me?

Computer: Well I am just tired all the time. I dont ever feel rested and all my energy is gone.

Student: How long has this been going on?

Computer: About six months ago I started feeling tired all the time. I finally felt that I have to do something about it.

Student: What did you do?

In this fashion, the student may query the computer-patient about the history and presenting complaints and the computer responds as the patient would. At any point in this interaction a physical examination or laboratory evaluation may be initiated. In response to each specific inquiry the computer provides a technical description of the physical findings or the laboratory report requested. At the conclusion of this data-gathering the student records both diagnosis and plan management. At this point the computer assumes the role of a Consultant and immediately responds with a display comparing the data actually gathered with the optimal data base, and the proposed diagnosis and management plan with the consultant's conclusions and recommendations.

Irrespective of their specific focus and methodology, all computer-assisted simulations are designed to provide the student/Physician with instantaneous feedback on the result of his decisions and an immediately retrierable record of his entire decision-making sequence for objective analysis and evaluation.

e) Life Simulations. Realistic clinical problems can also be posed through live simulations in which an actor, housewife, another student or almost anyone can be "programmed" to simulate a patient in an interview setting. In principle, live simulations differ from written and computer problems in only two respects: first, the student/Physician must necessarily generate his inquiries and interventions; and secondly, he must formulate them in a manner that is meaningful to the "Patient".

Live simulations have also been used to teach and to assess various skills in patient examination. On special note in this regard is the experience of Dr. Howard Barrows and his associates in programming simulated patients to display the physical findings of various neurological disorders.

HOW TO USE GAMES IN MEDICAL EDUCATION.

Properties of Academic Games: Games are conveniently defined as procedures in which participants play for a payoff permitted by the rules. A game is an academic game if any of its attributes (not necessarily its information content) are deliberately used to attain a learning objective. This means that no operational distinction needs to be made between game types and formats - all could be represented in the class of academic games. Any game's potential as a learning tool itself, or as a Kernel Academic Game, can be divined by an enthusiastic player who happens to notice within the game an analogy with some educational need. What sets games apart from

other activities and gives them their special flavour is that they contain a temporary mystery or interdeterminancy, the resolution of which ends the game cycle and provides the payoff. The mystery may concern the intentions or resources of an opponent, or the future events such as the turn of cards, roll of dice or speed of horses. The mystery and the search for the payoff powerfully attract the attention of players. In an academic game the teacher seeks to harness these to learning.

The Place of Games in the Timetable: Guilbert (1977) lists seven types of learning resources, but omits games altogether. When a learning need has been identified and an objective defined, a game is not necessarily the most natural choice. The learning pace in games is probably slower than in the more familiar situations, notably in use of printed didactic text. It is therefore unlikely to be preferred as a primary source of raw, factual information. A game is almost certain to simplify and isolate the group of concepts with which it is concerned, so that it is also unlikely to be reliable for cultivating the highest critical and evaluative thought. If, however, the teacher seeks the review of recently gathered information, its re-ordering and the exercise of associations with previous knowledge, the interpretation and problem-solving modes of thought, then his options are assignments (for example, problem solving or essay writing), the playing of games and simulations, and actual practice under supervision games appeal when the latter is not available and the former are already well used.

How do I obtain a Game to meet my Particular Need? There exists a Society for Academic Gaming, and Simulation in Education and Training (SAGSET) of which the Secretariat is situated in the Centre for Extension Studies at the University of Loughborough. This Society publishes a journal containing both simulating articles and useful reviews and citation lists. The Handbook by Gibbs (1974) and the other materials listed as "further reading" will direct the interested reader either to an existing game, or to a Kernel from which he can develop his own ideas. The field is already rich in games for social, geographical, and Mathematical Studies, and fairly well supplied for chemical and a number of historical topics. There are a few biological games, but in general the physical sciences have been neglected in this respect.

'Nephron' (Martin and Tremlet, 1978) is a snake and ladders analogue which rehearses the exchange along the renal tubule. 'Guts' (Lowe), (1975) is a "Happy Families" - type of card game which fosters appropriate mental association of food, substrate, enzyme and absorption site in alimentary. "CVS Rummy" (France, 1978) uses a more complex web of association to exercise the students' grasp of control mechanisms of the heard and circulation.

We know of three exercises which are concerned with social and management questions, 'Blood Money' and Hospitex. The latter (available from Management Games Limited, 33 Bedford Place, London WC1) rehearses the tasks of organizing ward work that fall to a nursing sister, and simulates the pressures that typical incidents of the working day can generate. 'Blood Money' (Greenblat, 1976) considers the dilemma of the

patient and health care and other agencies in a case of haemophilic set in the American Context. No doubt many departments of Social Medicine and Community Health run simulation exercises related to the delivery of health care, and it would be or great service if some of these were published in detail. An example here is Folmer's description of a simulation game to teach, learners how to allocate health care resources in a rational manner (Folmer, 1980).

THE USE OF SIMULATIONS.

a) In Instruction. As indicated earlier, the various simulation methods now available in medicine can be employed as instructional resources now only in the development of diagnostic and problem-solving skills, but also in the development of psychomotor and interpersonal skills.

b) In Assessment. Current research suggests that simulation techniques of the types described here are especially useful in evaluating (a) skills in gathering and interpreting clinical and laboratory data; (b) judgement in patient management; and (c) professional skills and attitudes requisite to effective interaction with patients and colleagues.

CRITERIA FOR USING SIMULATION.

a) In Instruction. Certain criteria for the use of simulation devices have been implied in the preceeding discussion; it would be possible to identify others that are especially pertinent to instructional uses of simulators. First among these is the requirement that the development and use of a simulator should parallel curricular needs. This assurance, along with the counsel and advice of members of the teaching faculty, guarantees that experience with the device will be supportive extension of the stated curriculum, as well as one that gathers support for the further application of such aids to the teaching programme by the faculty members themselves.

b) In assessment. In selecting simulation techniques for the purpose of evaluating individual competence and/or curricular effectiveness, the same consideration apply as in the choice of any other testing and evaluation technique. As with the instructional uses of simulation, it is first necessary to decide exactly what aspect of competence is to be measured at each level of education and experience. Once this decision has been made, the most appropriate technique is that which requires the student to perform a task resembling as closely as possible the real life performance for which he is being certified (test validity). Secondly, it is necessary to design the task in such a manner that different observers who are evaluating the student will agree about the character of his performance in the test situation. Thirdly, it is essential to create a sufficient number and variety of tasks to ensure that one can safely generalize from the students performance on the test exercises to his overall level of competence. Finally, both economic feasibility and logistic considerations must be taken into account in selecting any assessment technique. The four

criteria should be borne in mind in reviewing the advantages and limitations of simulation technique below.

ADVANTAGES AND LIMITATIONS OF SIMULATION.

ADVANTAGES	*LIMITATIONS*
1. It imitates real life.	1. It cannot measure all aspects of performance.
2. Gives more relevance perceived testing of student performance than other methods.	2. Can be expensive.
3. Can be predetermined and selected with the standards of the students in training, what student can learn.	2. Gives anxiety for students if they do not know their roles and the objectives of the course.

EXERCISE 1.

Obtain an example of a simulation exercise. Evaluate it with reference to the evaluation format.

EXERCISE 2.

Discuss in your group the various kinds of simulations that can be used and each select a different kind, that would be appropriate to try in your nrmal teaching area.

EXERCISE 3.

Design a simulation exercise arrived at through the above. Try it out in the group and evaluate it.

EVALUATION OF SIMULATION

	COMMENTS
Does the simulator focus on a complex dangerous - to - life, or highly personalised interaction situation	
Does it allow for self pacing or individualised earning by students?	
Can it be used repeatedly, if necessary by the same student?	
Does it provide the student with immediate feedback?	
Was it appropriate for the level of students?	

TEACHING METHOD

(6) SELF INSTRUCTIONAL MATERIAL

SELF INSTRUCTIONAL MATERIALS

Teachers all over the world are using aids of one sort or another, blackboard models, the overhead projector, films, tapes and slides to nake a few. The task of selecting an appropriate aid can be a formidable one, often leaving the teacher to rely on well tried traditional methods rather than experiment. Self instructional materials if used appropriately, can be an invaluable aid to teaching and learning; extending the role of the teacher and developing an independent attitude to learning in the student.

DEVELOPMENT.

The amount of self instructional material available for training courses is steadily increasing. The development of these materials has its origin in the system known as 'programmed learning'. While recently developed materials bear little resemblance to the early programmes, if examined critically they will be seen to adhere to the same three general principles:

Student Activity: i.e. the student is an active participant in the learning process doing what he is to learn.

Logical steps of learning: The subject matter is broken down into manageable steps of learning along which the student progresses at his own pace.

Knowledge of Results: The student is informed after each learning step whether or not he has given the correct answer.

TYPES OF MATERIALS.

Where as in the early days programmed learning was presented exclusively on a teaching machine or in text form, today programmed self instructional materials take many forms. Programmes can incorporate visual materials such as slides, films, overhead transparencies, models or actual apparatus. The information can be presented as written material or on tapes, work book may be provided in which the student makes his responses.

2. SELECTING APPROPRIATE MATERIALS

Whatever the reason for deciding to introduce 'self instructional' materials into a training course, it is of paramount importance that the materials teach effectively. It is necessary therefore to ask the following questions before committing oneself to the system:

a) "Do I really NEED self instructional material?"

If you are certain that the students already learn the topic or skill adequately by the present methods you employ then there is probably no need to introduce self instructional materials.

b) "How am I going to USE the materials?"

Are self instructional materials to be used to replace a formal class on a subject? Are they to be used as an additional aid to the course? Do all students need the material or just those in difficulty? In other words are self instructional materials to be used for:-

i) Initial learning of basic material.

ii) Enrichment (i.e. learning at an advanced level.)

iii) Remedial instruction (i.e. for students with learning difficulties).

iv) Revision.

v) Integration of different discipline.

c) "Is the material APPROPRIATE for the training course?"

Having taken the decision to introduce self instructional materials other important points to consider are:-

SUBJECT MATTER: Is it factually correct and relevant to the syllabus of the course? Does it have stated objectives which coincide with those of your own educational institution?

STUDENT POPULATION: For whom are the materials intended? Do the knowledge, skills and abilities of the intended the student population match those of the learners for whom the materials were originally designed?

TIME: How long will it take the students to work through the materials?

TESTS: Does the material have a test by which its effectiveness can be measured?

ADDITIONAL MATERIAL: Is equipment required (e.g. tape recorder, slide projector, X-ray viewer, models or actual medical apparatus) readily available?

CAUTIONARY NOTE.

Be wary of using self instructional materials which do not contain the following:-

a) A statement of the learning objectives.

b) A description of the students for whim the material is intended.

c) A statement of the knowledge and skills required by the student to make effective use of the materials.

d) A test by which to measure the effectiveness of learning (this is known as a terminal or criterion test).

e) Details of results obtained during evaluation trials.

Not all of these items of information will be available, but look for them and if in doubt, try them out on a sample of learners. Do not reject materials because of style and teaching approach. (See Annex 1 for sample of information statements.)

3. TESTING THE EFFECTIVENESS OF SELF INSTRUCTIONAL MATERIALS.

If in spite of evaluation evidence you are still doubtful whether or not your students will benefit from using the materials, it is possible to carry out a simple controlled experiment:-

a) Take a typical cross section of the students you are intending will use the materials (i.e. possess the same range of abilities and skills).

b) Give out the criterion (terminal) test, explain to the students this is to test the materials not them and not to worry if the score is low. (It will probably be found that there is a spread of scores from zero to more than 50% in this pre-testing stage).

c) Allow the students to work through the material under normal working conditions. Behave as you would with any other piece of work given out, do not urge the students to do well or emphasise the fact that this is an experiment.

d) Repeat the criterion test after the students have worked through the materials. The difference between the pre and post test scores is a reasonable guide to the effectiveness of the materials. Other factors are the acceptability of the materials to your students and the efficiency of the programme in comparison with conventional teaching methods (e.g. time taken, mastery of subject demonstrated, etc.)

4. USING SELF INSTRUCTIONAL MATERIALS.

If self instructional materials are new to your students it is essential that they understand the principles (page 1, paragraph 2) by which they are developed and how to use them to obtain maximum benefit. An introductory talk followed by working through a self instructional package under the guidance of the teacher is usually sufficient. Before using a self instructional package:-

a) Make sure the students have the necessary skills required to use it;

b) Check all necessary materials needed e.g. paper, equipment, apparatus etc., are available;

c) Check that students do in fact need the package by giving a pre-test (page 3, paragraph 3b). If you are certain they do, then there is no need to pre-test.

SUGGESTIONS FOR USE.

Class Work.

a) Allow all the students sufficient time to complete. Remember self instructional materials are self-paced therefore some students will finish before the others.

b) Give students a goal to work towards i.e. suggest units of time for completing sections of the package. Sometimes external pacing can have a motivating effect.

c) Ensure that students do in fact take the criterion test on completion.

d) Make sure that students who finish early know what to do next. Further independent study materials can be made available for them.

REMEDIAL WORK.

The same practical consideration listed in the proceeding paragraph should be borne in mind. As regards overall organization there are two ways in which self instructional materials may be used for remedial work.

a) When an individual student is finding a particular part of his course difficult the teacher may direct him to a self instructional package which will give him the additional help he requires.

b) Where a group of students are having difficulty with routine class work due to deficiencies in background knowledge and the teacher has almost to treat them as a separate class, it may be advisable to group these students at the back of a classroom, or direct them to a study room where they can work through the materials without disrupting the rest of the class. The decision here is dependent on the educational level of your students. What is important is to recognize their problem when it occurs.

ENRICHMENT.

It is useful to have self instructional materials available at an advanced level or on specialist topics, which students who have successfully completed routine class work can use if they wish to carry their studies further.

Where self instructional materials are housed depends entirely on the amount and type available and the general amenities of the institution. Where the amount of material is small this is usually best kept in the hands of the teacher and distributed by him as needs arise. When more materials become available it is advisable for these to be classified and become and adjunct to the general library facilities under the care of a qualified librarian.

5. SOME TYPICAL PROBLEMS OF USING SELF INSTRUCTIONAL MATERIALS.

a) *Students finish early and have nothing to do. This is an organizational problem which can be avoided by careful planning.*

b) *Students find the materials too easy and become bored and disruptive.*

POSSIBLE CAUSES.

The material is not at the right level for the students.

The students already know the material (pre-testing will eliminate this problem).

The materials may be of poor quality, this can happen in spite of careful selection.

c) *Students fail to complete the package in the time allowed.*

POSSIBLE CAUSES.

You have underestimated the time needed. (It is useful to keep a note of the amount of time required to work through materials for future reference).

Students have wasted time.

This problem must be dealt with on an individual basis.

d) Students score well on the test immediately after working through self instructional materials but do badly in the end of course test, or fail to apply their knowledge.

POSSIBLE CAUSES.

The two tests were not comparable.

The materials were not followed up and reinforced by discussion, further work and revision.

* * * * * *

This paper does not attempt to cover all the contingencies that may arise with the use of self instructional materials, merely the commoner problems experienced by teachers. It must be stressed that the use of self instructional materials in a training course does not exclude additional work by the teacher, it does however allow him more time to devote to those individuals who need his help.

* * * * * *

EXERCISE 1. PROGRAMMED LESSON.

To complete this exercise, cover the answers on the side of the page with a sheet of paper, uncovering each answer as you complete the question.

A PROGRAMME LESSON

ON THE BESIC PRINCIPLES OF PROGRAMMING.

1. The objective of this section is to "LIST THE FIVE PRINCIPLES OF PROGRAMMING". (No response required. Continue to frame 2)

---

2. You are now beginning a lesson on programmed instruction. The principle of SELF PACING as used in programmed instruction allows each student to work as slow or as fast as he chooses. Since you can control the amount of

time you spend on this lesson, this programme is using the principles of self _____

PACING

3. People naturally learn at different rates. A program that allows each student to control his own rate of learning is using the principle of _____

SELF-PACING

4. If a self-pacing programme is to be successful, the information STEP size must be SMALL. A program which is self-pacing would also apply the principle of SMALL _____,

---

STEPS

5. The average student will usually make correct responses if the correct size STEP of information is given. This is utilizing the principle of SMALL; _____

STEPS

6. A program that provides the student information in a STEP size which allows him to be successful is applying the principle of _____,

---

SMALL STEPS.

7. A student knows the material being taught, but has to wait for the remainder of the class. What programming principle is being violated?

A; SELF-PACING
B; SMALL-STEPS
C; NONE OF THE ABOVE

A. SELF-PACING

8. Two principles of programmed learning are:

A. _____

B. _____

A; SELF-PACING
B; SMALL STEPS.

9. In addition to enjoying the freedom of self-pacing and the success that is provided with a small step, most students like to participate and can learn best by ACTIVE RESPONDING. Therefore, the third principle of programming is the principle of ACTIVE _____

RESPONDING

10. A student is required to use what he has learned by indicating his response to a program. This is using the programming principle of _____

ACTIVE RESPONSE

11. Research indicates that the trainee does not learn materials unless he is provided IMMEDIATE CONFIRMATION of the correctness of his responses. In order that a student may learn from a program, the program must use the principle of IMMEDIATE _____

CONFIRMATION

12. In this program lesson you are now using, you can confirm your answer immediately. This lesson uses the principles of _____

IMMEDIATE CONFIRMATION

13. The principle of programming that rewards the student and creates confidence by providing the correct answer quickly is called the principle of _____

IMMEDIATE CONFIRMATION

14. A student is required to actively indicate his response to a program. What programming principle is being used? _____

ACTIVE RESPONDING

15. The active response principle of programming provides the programmer a source of actual trainee responses. Using these responses as a basis for revising the program is called

the principle of PROGRAM TESTING. The lesson from which you are now learning will be revised on this basis; therefore, it uses the principle of PROGRAM _____

PROGRAM TESTING

16. What principle of programming will show the author which steps in the program are NOT CLEAR or TOO LARGE? _____

PROGRAM TESTING

17. One method of ensuring that small steps are used is to try the program on several students and analyze their responses. This is utilizing the principle of _____

_____

PROGRAM TESTING

18. The principle of programming that permits you, the student, to proceed at your own rate of speed is the principle of _____

_____

SELF-PACING

19. A difficult subject is broken into parts so that the student can progress easily. This is utilizing the principle of _____

_____

SMALL STEPS

20. If the instructions in the program require the student to write his answers to questions, what principle of programming is being used?

_____ _____

ACTIVE RESPONDING

21. A student writes a paper for a college course. Because of the instructor's load, two weeks are required to get the paper corrected and returned. What principle of programming IS NOT being followed here ? _____

_____

IMMEDIATE CONFIRMATION

22. Based on student responses, a programmer revised a lesson and student errors were reduced from 25% to 5%. The programmer used the principle of _____

_____

PROGRAM TESTING

23. Research studies indicate the repetition strengthen learning. LIST THE FIVE PRINCIPLES OF PROGRAMMED LEARNING;

A. _____

B. _____

C. _____

D. _____

E. _____

A NOTE ON PROGRAMMED INSTRUCTION

The scarcity of health sciences teachers in the African region could be partially alleviated by provision of programmed learning material for auto-instruction. Auto-instruction may also play an important role in cases of classes composed by students with varying educational background, a case frequently met in this Region. Students could then be supplied with auto-instruction material and asked to work alone on several subjects in order to "catch up". Moreover, auto-instruction material has the advantage of permitting to the student to work on his own pace.

Two types of programmed material are extensively used:

a) Linear programming composed of sequential material of increasing difficulty and based on the principle of reinforcement immediately following a response. It is well known that such reinforcement facilitates learning.

b) Branching programming. This programming assumes that misunderstanding inevitably occurs during learning and that the program has the responsibility of resolving any learner's particular misunderstanding before he moves on through the program.

In health sciences, programmed instruction could be more extensively used as an adjunct or facilitating method than in a primary role. One can use material as it is presented in a well-written textbook and then prepare multiple-choice items with answers based on the same material (Pressey).

The programme in Exercise One was an example of Linear programming. A good example of branching programming can be found in Mager's book Preparing Instructional Objectives' Work through this book at some point.

EXERCISE 2.

Design a programme on a topic of your own choice. Distribute it to your colleagues or real students to complete. Then evaluate it in the terms of the evaluation format.

EXERCISE 3.

Discuss. Do you like using self instructional materials? What topics could be taught in your faculty using this method? What advantages would there be if you introduced self-instructional materials into your faculty? What would be the reaction of students and staff? Develop a brief statement or declaration about the introduction of self-instructional materials into HTl.

EVALUATION OF SELF INSTRUCTIONAL MATERIAL

	COMMENTS
Does the material allow students to pace themselves and repeat if necessary?	
Does the material build up steadily by small steps?	
Does the student have to actively respond?	
Was the time for the programme appropriate?	

TEACHING METHOD

(7) INDEPENDENT STUDY

INDEPENDENT STUDY

In this manual we are treating independent studies separately from self instruction. It is treated as a teaching method, as an approach to learning, involving self-direction, self instruction and individualized instruction.

WHAT IS INDEPENDENT STUDY?

Knawled (1975) defines self-directed learning as:

> *"Process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. ---- self-directed learning usually taken place in association with various kinds of helpers, such as teachers, tutors, mentors, resource peopoe, and peers."*

Andher useful definition is:

> *" students pursuit of academic competence in an autonomous manner as he is able to exercise at any particular time".*

The essential characteristics then of independent study are:

Student defined learning objectives.

Active student participation.

Use of a variety of human and material resources.

Individual pacing and levels of achievement.

Feedback devices so that student teacher can monitor progress

High degree of student autonomy

WHY USE INDEPENDENT STUDY?

Independent study as described above can achieve several things. It can:

- establish a climate in which students can progress in a selected area at their own pace.
- motivate students towards greater interest in a subject.
- place more responsibility for learning on to the student.
- stimulate a greater depth of understanding in the selected area.
- increase the students ability to learn independently.

These rest on three major assumptions about learning.

1) the efficiency and effectiveness of self-directed learnings is high.
2) self-directed learning is necessary to cope with the information explosion.
3) the natural development both psychological and cognitive of individuals ought to be encouraged and is valuable to development.

WHAT APPROACHES CAN BE USED?

Since learners have different intelligence, rates of learning, personality, attitudes and cognitive styles, independent study is one of the few approaches to learning that can accommodate all the differences. However there are several ground rules for the successful implementation of independent study:

1) Offer students a choice. This can be done by either inclusion of elective subjects or choice of topics for study.
2) Allow variation in scope and depth of topics. Care material that all students must know should be covered as core course material, but students should be allowed to vary the scope and depth of enrichment, activities.
3) Consult with students in setting of objectives. The approach in which learning objectives and criteria for assessment are determined jointly by teachers and students is termed 'contracting' and is a useful skill to develop where continuiing self-education is an important aspect of professional development.

4) Provide alternative methods for learning. Students quickly learn what suits their individual needs. Some prefer lectures, some tutorials, some reading and writing, some clinical exposure.

5) Vary the time allowed for learning. This is possible within limits, and allows self pacing to a certain extent. There will have to be limits though, as each student will have to achieve something within a certain period.

6) Establish open teacher-student relationships. In these kinds of project students need access to assistance. You do not have to be there all the time, but specify when you will be available and then be there.

7) Provide for self assessment. Particularly in the health professions the ability to evaluate and assess is critical. Help students to learn this skill by assessing their own performance.

EXERCISE 1.

Discuss ISP as used by any of the teachers in your group. Do they meet the criteria laid down? If they are not included in a course, what do you think are the reasons? Are these reasons sufficiently valid or overriding to prevent the introduction of ISP into the courses you teach?

EXERCISE 2.

Design an ISP for inclusion in any course you teach. It should specify exactly what is to happen, for which students, and what it is designed to achieve. Specify also how you will assess whether the student is successful or not.

EVALUATION NOTE.

You should evaluate any ISP against the criteria of essential characteristics. These tell you whether it really is an independent study project.

TEACHING METHOD

(8) TEAM TEACHING

TEACHING TOGETHER AS A TEAM [1]

R. de Tournay

Whereas team teaching is usually referred to in educational literature as a form of school organisation, in this chapter we will consider team teaching as a specific teaching strategy. Team teaching exists where two or more teachers with different preparation, abilities, and skills in nursing cooperate and share with one another the responsibilities for planning, teaching and evaluating a group of students. Team teaching is an effort to improve instruction by the reorganisation of personnel in teaching. Two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students .

Guidelines for Team Teaching

Anderson (1964) suggests six broad guidelines for team teaching , as follows : (1) all team mebers, including students or student representatives, participate in the formulation of objectives for the course or program under preparation ; (2) all team members participate at least weekly in the formulation of the more immediate objectives of instruction ; (3) all team members be given at least periodic opportunity to contribute to the daily planning of colleagues ; (4) all team members be at least minimally conversant with the specific daily plans of the other team members ; (5) all team members should at least occasionally carry on teaching functions in the presenceo of colleagues whose roles might alternately be to assist, to observe student reaction, and to offer constructive criticism in subsequent discussion; and (6) all team members participate in periodic evaluation of the program or course.

It becomes obvious from even thinking about operationalising these guidelines that the amount of time required within the teaching team to converse with one another and attaned to the group processes, as well as have energy left over for students is a tremendous undertaking. Team teaching does indeed take more time than individual teaching .

Advantages of Team Teaching

Team teaching broadens the quality of a students education by exposing her to the competence of more than one teacher . It allows the more competent, the more committed, and the more influential teachers to play a more significant role in the life of more students. Team teaching , then, can improve the quality of instruction by giving teachers an opportunity to learn from other team members . The nursing instructor who is exceedingly skilled in teaching can be given and intermediate leadership role which is still a teaching role. As a team leader, this nursing teacher can share her skills and insights with colleagues directly, and thus influence other teachers .

Team teaching can provide a way of allowing teachers to specialise and retain their expertise in clinical nursing within the philosophy of an integrated nursing program. Instead of teaching in a segmented block of experiences, this teacher may be the one to help students apply general principles of nursing to a specified clinical area .

1. from R. de Tournay, Strategies for Teaching Nursing, Wiley, 1971, pp 125 - 130

Anderson (1966) points out that inspite of efforts to provide teachers with supervision and inservice growth opportunities, the typical teacher in the elementary or secondary school is insufficiently informed in the content areas and insufficiently proficient in technical aspects of teaching . The same statement can be made of nursing instructors Under the false label of academic freedom, all kinds of idiosyncratic, unsuitable, or indefensible teaching behaviour can flourish in schools of nursing Team teaching's truly supreme virtue is that it ocauses teachers to look at themselves and one another critically and supportively It provides opportunities to see alternatives, and discover new solutions to old problems

KRAMER (1968) in describing the utilisation of team teaching in a baccalaureate nursing program, points out that by breaking teaching strategie s into their component parts, members of the teaching team skilfully blend strengths and personal preferences in teaching to produce an optimum climate for student learning. Teachers teaching together bring out divergent points of view, thus encuraging students to challenge ideas and perceptions. Members of the team collaborate in the assessment of student learning behaviour by systematically observing students during a class session and sharing student feedback . The improvment of teaching strategies which takes place when a course is taught, planned and evaluated by a group rather than an individual teacher is considred a major advantage.

Kramer (1968) administered a questionnaire to involved students and faculty. The results indicated that both students and faculty wre overwhelmingly in favour of being taught, or teaching, by team teaching. Students favoured the presentation of varying points of view. They cited as a disadvantage the lack of continuity and internal consistency more often found in a course taught by one instructor. Faculty rated the opportunity to learn from colleagues as beneficial. New teachers stated that the shared teaching responsibility during the orientation period was aspecially helpful.

Disadvantages of Team Teaching

Disadvantages mentioned in Kramers study by the teachers included the increased time required for planning, and the slowness of the group process. One half of the experienced teachers stated there was a feeling of loss of individual autonomy in team teaching.

Team Leadership

Is Leadership necessary in terms of a formally designated leader ? It is thought that it is for several reasons First a large amount of time is needed at the beginning of a course where the teachers are becoming a group. Second, they are assisted by someone designated as responsible to whom members of the group can turn with problems. The administrator of the school must have someone who can speak for the teaching team . The 'administrivia' of the course must be handled - ordering books, placing library books on reserve, etc.

Size of Team

Grouping of students and class size are more easily manipulated when team teaching is utilised . By sheer tradition , perhaps, many schools of nursing divide classes into clinical teaching groups numbering from eight to ten students, into seminar groups numbering twenty, and in large lecture-discussion groups of the entire class . Experience to date seems to indicate that when a faculty first becomes involved in teaching as a team, teachers essentially use the same teaching procedures they did when teaching alone . It is well to keep in mind the advantages and disadvantages of both large and small gropp teaching ; within the limitations of space in the college, the teaching team can develop flexibility in selecting the size of the group and activities to meet the instructional objectives most effectively.

* * * * * *

TEAM TEACHING

In many educational institutions team teaching has gained increasing importance, but is rarely bred in health training institutions. A definition of team teaching by Farrant (1980) states:

> *"Team teaching is a co-operative approach to teaching in which a group of teachers take responsibility for the education of a large group of pupils. The teaching programme is planned in relation to the nature of the topics to be taught, the composition of the pupil group, the resources available and the particular skills of the teachers ..... the teachers work programme is determined by the team ....."*

The advantages of this approach are that it -

- allows a flexible use of teaching space.
- makes possible more attention for individual students.
- makes use of varied skills, of different teachers.
- avoids wasted time caused by teaching the same things to different classes following the same or similar courses (e.g. basic anatomy, psychology, epidemology, nutrition).
- can allow students greater responsibility in managing their own learning.

As such team teaching is not a specific teaching method, but allows the application of a variety of teaching methods as a team. In addition, to those mentioned above, team teaching requires that planning is undertaken co-operatively, and usually is only successful when the participating teachers can work as part of a team, but the advantage of that in a multidisciplinary institution is that the team concept, so important in health work, can be implemented at an early stage in the students' experience. Critics of team teaching point out that it takes more time in planning and preparation, and prevents a close teacher-student relationship developing. There are claims that without adequate training, teachers teach worse by team teaching than by normal methods.

EXERCISE 1.

Discuss any examples that the group have seen of team teaching. Identify possibilities for team teaching in your own health training institutions.

EXERCISE 2.

As a group plan a team teaching session to last for one hour. Implement this session, using another group as the learners. There is no specific evaluation format, but following the trial experience, evaluate how successful you thought it was, which aspects were particularly good and which aspects were negative? Could anything be done to improve the negative aspects?

SELECTING A TEACHING METHOD

By now, you should have a beginning competence, and certainly a high range of teaching methods. Hopefully, you are also aware of the immense range of possibilities now opening up to you as a teacher. It is no longer the level of student, or the subject matter that dictates to you how to teach, but rather the objectives for the learners, and your ability as a teacher to use the learning environment, including students and resources, to help them achieve them.

We have included a short article which discusses what should be considered when selecting appropriate teaching methods, and a table summarising the advantages and disadvantages of certain methods. These can only give you guidance as how to select. The actual choice will always be up to you.

WHICH TEACHING METHODS SHOULD YOU USE?[1]

K. Cox.

The teaching methods described in this section offer a wide variety of options for teachers who are seeking ways to make teaching and learning more effective. This chapter is a summary of factors to consider when you are choosing teaching methods.

Medical teachers, faced with a session of student teaching, have options on how that session would be most effectively conducted. First thoughts turn to a lecture or a tutorial with the choice apparently determined by the number of students. Numbers, however, are not the only factor, nor lecture and tutorial the only options. The factors are:

1) What the teaching session is intended to achieve.

2) What you, the teacher, feel capable of doing.

3) What the students want and expect.

4) What the subject matter requires.

1. WHAT THE TEACHING SESSION IS INTENDED TO ACHIEVE.

Your subject may be immunology (in molecular biology or pathology or allergy or transplantation) in which the concepts and the literature are changing rapidly, students need some perspective in a difficult field, and none of the textbooks is satisfactory. The responsibility is on the teacher to spell out the concepts lucidly, to separate observations from speculations,

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[1] from Cox,K and Ewan C: The Medical Teacher pp 126 - 129

and to attempt to integrate ongoing research with current understanding of the phenomena. Since you are the source, and all students ought to hear you, a carefully planned lecture is logistically the most efficient one-to-many format for expounding, explaining and emphasizing (Bligh,1972).

> *"To guide students through a complex subject, to give perspective on issues, to provide a framework within which students can sort out ideas, or to explore the growing edge of a field - for these a lecture is cost-efficient in teacher and student time"*

Your subject may, however, be straighforward and factual with a relatively low level of ambiguity, say, as in much of osteology or pharmacology. The subject matter will be thoroughly described in textbooks, but may need highlighting or extraction of cogent areas. Since students must learn this material, it must be available to them in written form, either as your notes or with indication of specific textbook pages. Since the material is already available in written form, repeating the same facts publicly in a lecture is redundant. Using the lecture to have the students transcribe what is already written dulls attention even for the most compulsive students.

> *"To cover the facts in a subject, to emphasize and]or summarize - for these a lecture is wasting teacher and student time. Use printed notes and textbook references"*

Your field may present students with complex processes which they commonly confuse, for example, in renal physiology or acid-base balance. No matter how lucid your lecture, students need to wrestle with the concepts and express their uncertainty. Until you have heard your students explain or apply the principles, neither you nor they can be sure if they have a clear grasp of the subject.

> *"To help students grasp difficlt concepts and bring their misconceptions to the surface - for these, discussion in a small group such as a tutorial is needed" (Rotem and Manzie, 1980)*

If students are to learn how to do something, such as drawing blood or passing a catheter, first they must watch the process demonstrated, from close enough to discriminate the finer points. Some procedures, such as stimulation of a heart-lung preparation, can be repeated for successive groups. When repetition is not possible, as with lumbar puncture, the sequence can be recorded on film or video tape, enabling each screening for a large group.

> *"To learn skills, such as neurological examination, the sequence is demonstration followed by practice and feedback on performance" (Beard et al, 1978)*

Students vary in how quickly new ideas are picked up, in which areas are hard and which are easy, in how much repetition is needed, and in what medium (written, verbal, visual) seems most effective for learning.

Some students need to work through control of fluid and electrolyte balance slowly and repeatedly before the concepts are grasped. Teachers cannot afford the time for such personal guidance for more than a few students; but that guidance can be crystallized in a sequenced plan of words and pictures.

> *"To work through difficult material at different speeds which adapt to individual differences, construct a sequenced text]tape]slide program which, students can tackle individually at any time and pace"(see Ch. 3, 29).*

2. *WHAT THE TEACHER FEELS CAPABLE OF DOING.*

Some teachers tackle a lecture with great flair and panache, and can leave a lasting impression long after the lesson is forgotten. (What we remember of our teachers from school are their personalities and how we felt about them, not what they taught us]. Few of us are so talented, but our lectures can be effective, given knowledge of the subject, clarity of presentation, and enthusiasm.

Most teachers feel obliged to cover their subject rhoroughly. Given large subjects and little time, teachers may choose lectures as the most efficient way of ensuring that all students hear all about the subject, even when they know the students can't digest it. Since the goal is effective student learning, teachers must trade-off lecture coverage against comprehension.

> *"The teacher's goal of subject cover can be achieved without the teacher having to say all the words. The use of handouts and supplmentary tutorials or tape slide programs can lower the sense of pressure on the teacher".*

Many teachers are uncomfortable in small group discussion with students. Discussion is often difuse, ill-informed and slow which is frustrating both for teacher and student. The teacher is likely to resolve his or her tension by setting out the "correct answers". Discussion then usually stops, and the session becomes a teacher-centered mini-lecture with questions.

Teachers can structure tasks for the tutorial group to work through (see Ch. 13], enabling students to help each other clarify ideas and apply principles to new areas. The students group can then approach the teacher to help with areas of persistent difficulty and to check on their success. The teaching of anatomy has been structured in this way, so that after a brief lecture and/or demonstration students work out what muscles move the shoulder joint which way, or what would be the effects of occlusion of the pancreatic duct or of pancreatectomy (see Blunt, 1976].

A few teachers have the interest and tenacity to develop a logical, sequential learning program (text and/or tape and/or slides).

3. *WHAT THE STUDENTS WANT AND EXPECT.*

All students want to pass the examinations. So long as the examination system rewards students for memorizing facts, the pressure will remain on teachers tu summarize the important facts for anxious students. When teachers devide to test and reward other facets of 'being a good doctor' students will learn those facets.

Most students want to learn about being a doctor as soon as possible. Students begin as obedient learners who assume teachers have planned a relevant and coherent program. When the relevance is remote and unclear, and the planning incoherent, students lose motivation and 'serve time' until they reach 'real medicine'.

Some students become intensely involved and excited, especially when treated as adults (which they all are) who can share in tackling interesting issues and problems. What students 'want and expect' can turn very much on the attitude of the teacher.

4 *WHAT THE SUBJECT MATTER REQUIRES.*

Understanding a particular topic requires knowledge of many prior facts and concepts. Sciatica cannot be comprehended without knowledge of the anatomy of dermatomes and myotomes and of the vertebral canal. To understand jaundice requires knowledge of the anatomy and physiology of excretion of bile.

The sobject matter for medicine comprises knowledge, skill and attitudes. The teaching of knowledge requires a mix of lectures, discussion and directed reading; the teaching of skills requires demonstration and supervised practice; and the teaching of attitudes will follow from modelling on selected parts of the teacher's behaviour.

IN SUMMARY -

Choose the lecture if:

1. the purpose is to lay out or review a subject, to give perspective and emphasis to parts, or to revise and summarize,

2. the teacher can deliver a lucid and vivid lecture at a level the students can comprehend,

3. the students are ready for this lecture in terms of their prior knowledge, and find lectures an effective method for learning,

4. the subject matter is appropriate to be taught by the lecture method,

Supplement the lecture with handouts, small group discussions, tape/slide programs and short self-tests as far as practicable.

Choose the tutorial if -

1. the purpose is for clarification of student ideas about a subject,

2. the teacher can facilitate student discussion, either within the group or by meeting the group after discussion,

3. the students understand the subjects sufficiently well for satisfactory discussion, have a clear idea of their task as a group, and are reasonably skilled in managing a group discussion,

4. the subject matter requires discussion and clarification of concepts and semantics.

Make use of what is learned from the tutorial to help some students go back over essential material that should have been learned before, and to help other students go in their reading to greater depth in the subject.

Choose a text/tape/slide program if -

1. the purpose is to help the student move progressively through a difficult subject, if students are known to move at different speeds, if for some students it seems appropriate to supplement the written with the spoken word and both with visual demonstrations,

2. the teacher wishes to allow self-paced learning by students and to use himself as a resource to students, and the teacher has the energy and the resources available to put the program together,

3. the students find the method acceptable and effective, given well-devised programs,

4. the subject matter is amenable to being compartmented and sequenced. Recognize the need to supplement the method with discussion and "real world" material (e.g. necropsies, patients).

Choose a demonstration followed by supervised practice if -

1. the purpose is to learn skills

2. the teacher is skilled in clear demonstration

3. the students can comprehend what is being demonstrated, and have immediate opportunity to practise the skills, on a simulation, if necessary

4. the subject matter is amenable to direct demonstration of can be captured on film or video tape so that the lessons within the demonstration can be extracted (e.g. in interviewing skills).

These four variables, then, (the purpose, the teacher, the student and subject matter) are central to the planning of all teaching. Neglect of any of them leads swiftly to inadequate teaching.

* * * * *

ADVANTAGES AND DISADVANTAGES OF CERTAIN TEACHING METHODS

(Adapted from Beard, Teaching and Learning in Higher Education)

Lecture	- Apparent saving of time (for the teacher) and resources. - Presence of the teacher - Covers a large group of students - Gives feeling of security - Enables a large amount of information to be presented	- Keeps the students in passive situation - Does not facilitate learning problem-solving - Offers hardly any possibility of checking learning progress - Does not allow for individual pace of learning - Low receptivity
Practical work Beside teaching Field Work	- Puts the student in an active situation - Covers a limited group of students - Permits evaluation of degree wo which educational objectives have been attained - Develops qualities of observation and decision taking - Ensures closer contact with reality (professional health situation of country, colleagues and teachers) - Permits comparison between reality and theory - Enables student to develop self-confidence - Increases variability	- High personal costs - Sometimes puts the patient in a difficult situation - Poor Standardization - Narrow limits of utilization
Small group activities	- Permits a teacher/student dialogue - Facilitates evaluation - Facilitates participation.	- High costs in personnel and time
Programmed Learning (from books) and simulation	- Enables student to work at his own pace - High efficiency - Facilitates self evaluation - Permits mass teaching - High availability - Facilitates decision-taking (solution) of complex problems - Decreases risk (for patient or society	- Necessitates special educational competence - High initial investment costs (in teachers' time and money) - No group dynamics.

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